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ABSTRACT

This report describes a project developed: (1) to assess the value of a quarry as a learning resource; (2) to identify and evaluate available instructional resources; (3) to produce instructional units and materials specific to the quarry; and (4) to make recommendations for implementation and development based on survey information. The Jamesville Quarry Environmental Education program is presented as a model that is applicable to the development of other environmental education programs with industrial sites as their focus. A bibliography is included. Appendices present survey forms and summaries of survey reports. (MA)

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Jamesville Quarry Environmental Education Project

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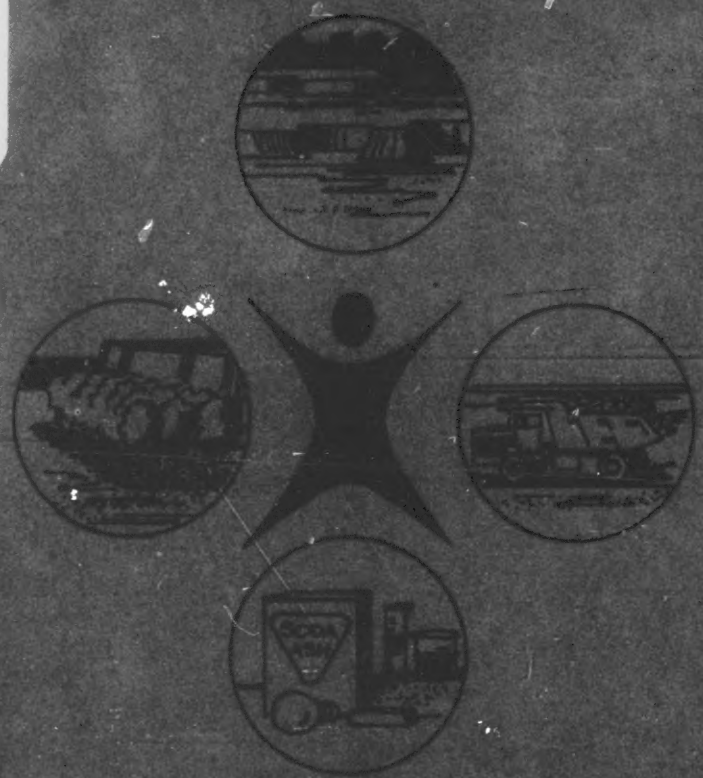

Final Report

SE 025 215

Dr. David L. Hanselman, Project Director
compiled by John Ferrell and Kathy Buffington
under a grant from Jamesville Quarry (Allied Chemical Corporation)
with the cooperation of the SUNY College of Environmental Science and Forestry
Syracuse, New York, 1977
Illustrated by Don Eaton

A Report From

The Research Foundation of the State of New York

ASSESSMENT AND PRIORITY-DEVELOPMENT FOR ENVIRONMENTAL EDUCATION RESOURCES ON JAMESVILLE QUARRY, ALLIED CHEMICAL CORPORATION

A cooperative environmental
education research project of:

The State University of New York College of
Environmental Science and Forestry

and

The Jamesville Quarry, Allied Chemical Corp.

1975-1977

Final Report prepared by Kathryn M. Buffington, Research Associate

Submitted May, 1978 by David L. Hanselman, Project Director

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Thanks, everybody!

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TABLE OF CONTENTS

Title Page.....i

Acknowledgements.....ii

Table of Contents.....iii

List of Tables.....iv

List of Figures.....v

What's It All About?.....1

The Jamesville Quarry Environmental Education Project.....2
The State University of New York College of Environmental Science and Forestry Involvement.....3
Environmental Education; Environmental Education and Industry, Business and Labor.....4

Achieving the Objectives.....7

The Quarry as a Learning Place.....10
Available Resources.....14
Materials Development.....18
Alternatives and Recommendations.....20
*PROGRAM RECOMMENDATIONS.....25
*STAFFING RECOMMENDATIONS.....31
*FACILITIES RECOMMENDATIONS.....34
The Quarry Project as a Model.....35
Bibliography.....37

Appendixes.....40

1. Study Participants.....41
2. Study Non-participants.....45
3. Tour Schedule for Study Participants.....46
4. Round 1: Worksheet.....47
5. Round 2, Part I: Questionnaire, Discussion and Results.....50
6. Round 2, Part II: Questionnaire Samples, Discussion and Results.....52
7. Survey of Quarry Employees.....69
8. Survey of Children.....71
9. Survey of Industrial Resources: Letter, Survey, Corporation, and Response.....73
10. Survey of Educational/Environmental Resources: Letter, Person/Organization, Response.....88
11. School/Group Visits, Spring, 1977.....103

LIST OF TABLES

Table	Title	Page
1	Responses to Industrial Resources Survey	15
2	Responses to Educational/Environmental Resources Survey	16
3	Sample Learning Experiences: Fieldtrips for Cadette Girl Scouts (7th-9th Grades) and a Fourth Grade Class	22
4	Participants in Study	41
5	Responses to Follow-up Survey	45
6	Round 2, Part I Questionnaire Results	51
7	Round 2, Part II Questionnaire: Means and Ratings	55
8	Responses to Survey of Employees	70
9	Responses to Survey of Children	72
10	Industrial Resources Survey: Corporations, Headquarters' Cities and Responses	76
11	Educational/Environmental Resources Survey: Person/Organization and Response	89
12	School/Group Visits, Spring, 1977	103

LIST OF FIGURES

Figure	Title	Page
1	The Jamesville Quarry Environmental Education Project	9

What's It All About ?

THE JAMESVILLE QUARRY ENVIRONMENTAL EDUCATION PROGRAM

The Jamesville Quarry Environmental Education Project has been a research effort of the State University of New York College of Environmental Science and Forestry in cooperation with and funded by the Jamesville Quarry, Allied Chemical Corporation, Jamesville, New York. The broad goal stated in the original proposal was to "...develop a valid and practical blueprint for environmental education." That goal was further refined to the four specific objectives below.

1. Determine the value of the Quarry site and operations as a learning resource, especially for environmental education.
2. Identify and evaluate the instructional resources available.
3. Develop and produce instructional units and materials for environmental education based on the Quarry and its operations.
4. Make recommendations for implementation and development of an ongoing environmental education program commensurate with the findings of the investigation.

THE COLLEGE INVOLVEMENT

It may at first seem strange that the State University of New York College of Environmental Science and Forestry took the leadership for a project such as described above. However, there has been a history of cooperative educational and research efforts for several years. In March, 1973, a $55,000 grant was made to the College to investigate three general areas at the Quarry: stabilization, rehabilitation, and future use (Richards, 1975). In addition to the monetary support, the Quarry management provided staff to help researchers at the site, equipment and labor for some projects and a general willingness to cooperate and offer information.

When the Quarry management first considered an educational program, they contacted a local environmental organization, Onondaga Nature Centers, Inc. A consultant visited the Quarry on January 29, 1975, and reported on several potential educational uses for the site. Desiring a more in-depth study, validation, and program recommendations, the Quarry management again called upon the College. Dr. David Hanselman, Associate Professor of Environmental Education/Communications was invited to submit a proposal which was subsequently accepted and $17,400 was allocated to the College for the project in August, 1975.

Kathryn Buffington was selected as Research Assistant. She brought to the project several years' experience as a classroom teacher, environmental educator, and familiarity with local environmental education efforts. The research and development undertaken for this project has become the basis for her master's thesis.

ENVIRONMENTAL EDUCATION; ENVIRONMENTAL EDUCATION AND INDUSTRY, BUSINESS AND LABOR

Common usage of the term "environmental education" emerged from the environmental awareness of Earth Day, April 22, 1970. Its first use is credited to Professor Clay Schoenfeld from the University of Wisconsin at Madison. Most people in the field agree that the new "environmental education" has drawn on earlier areas: conservation education, outdoor education, and resource-use education.

Just what is environmental education? The term has been defined many times by people with varying philosophies. Some view it as a way of thinking about the world: a systems approach where the belief that everything is related to everything else shapes all actions (McInnis, 1972). Some view it as an educational process. Many definitions and philosophies of environmental education were examined and the following definition was chosen as most appropriate: "...the development of educational processes dealing with man's relationships with his natural and manmade surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment. These processes would be designed to help the learner both to perceive and understand the concepts of 'environment' and environmental principles and problems and to be able to identify and evaluate alternative solutions to environmental problems..." (Federal Register, 1974, part 183.1,a).[1]

[1]During the course of this study, environmental education has become an international concern. The historic International Belgrade Workshop on Environmental Education has accepted the following definition: "...environmental education may be viewed as primarily concerned with the education of all citizens—providing them with an awareness of environmental problems in their daily lives and the knowledge, skills and commitment to work toward their solutions. It is directed at people of all age levels, not only in all types and categories of formal education (including pre-school, primary, secondary and higher education students as well as teachers), but also in various non-formal programmes (including those for youth and adults, individually and collectively, from all segments of the population). (Connect, 1976,p.2)

A great deal of time and effort can be invested in determining which definition to use, what the subtle differences are and why they are different. Defining environmental education is still a major topic of discussion among profession educators and environmentalists (Tanner, 1974). A more important consideration, however, is to choose an appropriate definition and modify it as needed. For the purposes of this study, the Federal Register definition was chosen as most suitable.

Less debate is centered on the justifications for environmental education. Paul Studebaker in the Journal of Environmental Education puts it most succinctly:

> "Today...nations are faced with a new social need to which education must respond. It is the need to survive in the face of overpopulation, environmental pollution, and rapidly dwindling supplies of natural resources. Today a nation needs to have not only a productive economy, but one which relates to nature in such a way as to preserve the life support system. Otherwise, a healthy and populous industrial society will consume and pollute itself into oblivion." (Studebaker, 1973, p.45)

It is this need to survive in an environment supportive of human well-being that has brought environmental managers, scientists and now educators into the ranks of those who are making decisions on the allocation of natural resources and contributing to economic growth and maintenance.

A landmark conference held in July, 1975, at Snowmass, Colorado[1] to determine the status of and establish goals and strategies for environmental education recognized the role of business, industry, and labor in one of their key findings: "Labor, industry and business recognize that their participation in environmental education is a desirable and necessary experession of social responsibility and is integral to their enlightened self-interest, and that environmental educators should recognize and use the expertise of labor, industry,

[1] Representatives of business, industry, and labor were included in the conference.

and business in political, economic and technological processes" (Schafer, 1975, p.9). Specific recommendations followed:

> "Labor, industry and business should continue to provide educationally sound services for environmental education;
>
> Labor, industry and business should develop cooperative relationships at the national, state and local levels between themselves and formal education institutions, pre-school throught higher education; and
>
> Labor, industry and business should provide environmental education leadership and direction for reaching the community, especially adults, where they live, meet and play" (Schafer, 1975, p. 9 and 10).

The environmental education project at the Jamesville Quarry is a paradigm for translating those recommendations into an action program.

Achieving The Objectives

The basic organization of this project can be found in Figure 1. To meet the objectives (Fig. 1, Box 1), several techniques were used.

To assess the value of the Quarry as a learning resource and to determine what educational materials should be developed, a very modified Delphi technique was used. Delphi is a method for predicting the future using the opinions of experts. The experts rate a list of needs, events, or options. The results are compiled and re-submitted to the experts to be rated again. This may be repeated for several "rounds". This study was Delphian in the sense that experts rated and re-rated. They did not however, predict the future. They evaluated learning experiences, the site, and methods of implementation. Round 1 (Fig. 1, Box 11) consisted of gathering data from 50 study participants with an open-ended worksheet. Round 2 (Fig. 1, Box 14) was an evaluation of 107 ideas that were synthesized from the raw material generated in Round 1.

Supporting the data collected by the Delphi rounds was a series of surveys: Quarry employees (Fig. 1, Box 6), children who had visited the Quarry (Fig. 1, Box 13), teachers/group leaders who had brought groups to the Quarry (Fig. 1, Box 16), 15% of the top industries and trade associations in the United States (Fig.1, Box 9), 111 state environmental education coordinators or environmental agencies/organizations (Fig. 1, Box 9), and a follow-up of non-participants (Fig. 1, Box 12). In addition to the surveys, there were interviews (Fig. 1, Box 7), historical research (Fig. 1, Box 8), and a literature search (Fig. 1, Box 10). The specific procedures and discussion of each element can be found in the following sections.

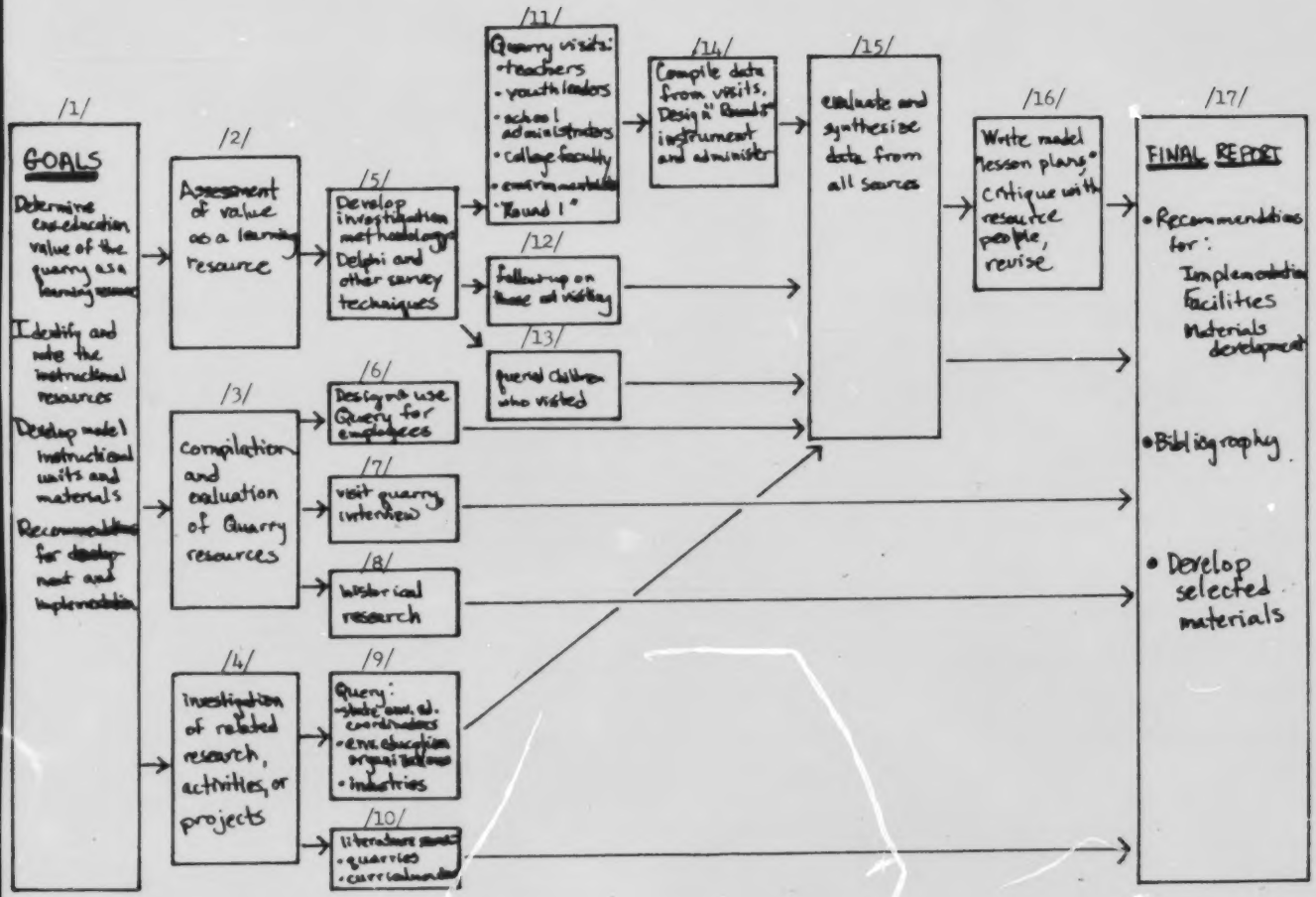

FIGURE 1: THE JAMESVILLE QUARRY ENVIRONMENTAL EDUCATION PROJECT

THE QUARRY AS A LEARNING PLACE

Objective 1: Determine the value of the Quarry site and operations as a learning resource, especially for environmental education.

To determine the value of the Quarry as a site for learning experiences, three investigations were undertaken. The major investigation brought people with various viewpoints and backgrounds into the Quarry. Two smaller studies involved the employees of the Quarry and children who had visited the site.

Round 1

The Quarry assessment and valuation process was performed by 50 people.[1] The participants were a mixture of elementary, middle and high school teachers at public and private institutions, college and university faculty and graduate students, school administrators, environmental educators, youth leaders and reprensentatives from government and environmental commissions.[2] These people visited the Quarry in the spring and fall, 1976 for Round 1 of the two-part study.

Round 1 was primarily an information gathering operation. Participants were led on a five-hour tour of the Quarry. The tour was designed to give an overview of the Quarry mining and land reclamation operations and the geology of the site. An historic trail depicting earlier events of limestone mining which was under development was also visited. The tour was conducted in an informal manner and participants were encouraged to ask questions on any aspect of the operation.

At the beginning of the visit, a worksheet[3] was given to participants with instructions to note any ideas for educational activities. Initially, they were not asked to weigh the merits of

---

[2] A list of participants and their positions can be found in Appendix 1, page 41. A schedule of the visits can be found in Appendix 3, page 46.

[3] A copy of the open-ended worksheet can be found in Appendix 4, page 47.

[1] The 50 participants were from a pool of 126 invited people. The pool was representative of the community: at least 1 representative of each of the mentioned groups was invited.

particular learning experiences--just elaborate them--anything and everything they could think of. The worksheet was a list of all the areas at the Quarry to which the visitors would be exposed (e.g. quarry floor, machinery, reclamation area, etc.). Participants were encouraged to use the backs of the sheets or additional pages if they found the worksheets constrictive or inadequate. The original intention was to collect these worksheets at the end of the day. However, many of the participants expressed a desire to have more time to complete them. So, after the first visit, stamped envelopes were provided for returning the worksheets.

Round 2

Round 2 was a valuing process. The hundreds of responses from the Round 1 worksheets were compiled into the two-part Round 2.[1] Round 2, Part I was a list of 15 ways a program could be implemented (e.g. hire an educator, put money into materials development, build facilities, etc.). Round 2, Part II was a list of 107 items--either materials to develop or activities. The 107 items were divided into 10 categories: trails and tours, field studies, displays, research projects, discussions, recreational, simulations, lab studies, publications/AV materials, and "creative". All the ideas mentioned in the Round 1 worksheets were included somewhere in Round 2; either in the implementation strategies of Part I or the materials/activities ideas of Part II.

To conduct Round 2, the 122 item survey was mailed to the 50 people who had visited the Quarry and filled out the Round 1 worksheet. Forty-one of the 50 returned the Round 2 questionnaires. Nearly all (38 of the 41) rated all the items. The results of their ratings will be discussed later. Round 2, in addition to Parts I and II, included the question "Is the Jamesville Quarry an educationally valuable resource?" Thirty-seven of the 41 people returning Round 2 answered "yes." The other four skipped the question. Based on this

[1]Samples from the Round 2, Part II questionnaire, discussion and detailed results can be found in Appendix 6, page 52.

very positive response and the positive responses to many of the Round 2, Parts I and II items, the conclusion can be drawn that there are indeed many valuable potential learning experiences related to the Jamesville Quarry.

Quarry Employees' Survey

The second survey was made of employees of the Quarry. It was thought that as people very familiar with the site, they might be able to offer some valuable advice.

The survey of Quarry employees[1] involved a checklist of places on the Quarry property that "should" and "should not" be visited. Twenty-nine and six-tenths percent (8 out of 27) of the salaried employees and 16.6% (26 out of 156) hourly employees returned the questionnaires.

Most of the employee respondents agreed that visitors should see the commercial stone piles, the crusher, trails, mined pits, reclamation area, tailings pond, unmined area, machinery and spoils piles. There was a split over whether or not visitors should see the blast[2] and tour the offices. On both items, 50% said they should be visited and 44.1% said they should not. Again, the conclusion can be drawn that, according to Quarry employees, there are valuable learning experiences available at the Quarry.

Survey of Seventh Grade Visitors to the Quarry

The third survey was of children who had visited the Quarry in May, 1976. The 90 children from Pine Grove Middle School, East Syracuse-Minoa School District, East Syracuse, New York, were seventh graders at the time of their visit. The survey of children[3] had two purposes: 1.) to see what kinds of things the students would show to visitors if they were in charge of trips, and 2.) glean ideas for

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[1] A questionnaire, discussion, and details can be found in Appendix 7, page 69.

[2] There are two explosions per day to loosen rock to be hauled away by truck. The blast can safely be observed from a distance.

[3] A questionnaire, discussion, and details can be found in Appendix 8, page 71.

altering or improving field trips.

Student questionnaires were distributed to approximately 90 children one year after their classes had visited the Quarry. Twenty-six students (17 girls and 9 boys, all aged 12 or 13) answered questionnaires. In answer to the question "If you were in charge of taking visitors around the Quarry, what would be the one thing you would make sure you showed them?" "The blast" was the response of 65.4% (17 out of 26). The reclamation area and the 100,000 ton capacity trucks each received 7.7% of the response. Seeing the quarry floor, getting off the bus more, riding the Euclids (trucks), seeing different rocks, and seeing the crusher each received 3.8%.

Based on the results of this survey, the conclusion can be made that the children found many learning experiences at the Quarry.

AVAILABLE RESOURCES

Objective 2: Identify and evaluate the instructional resources available.

Environmental education materials dealing with programs associated with industrial sites are almost non-existent. The traditional literature search turned up almost nothing. Because of this lack of background information, two surveys were initiated: an industrial survey and an educational/environmental survey. Additionally, a vigorous search was made locally for miscellaneous materials such as in-house publications of Allied Chemical, student projects, newspaper stories, etc.

Both the industrial and education/environmental surveys were undertaken in hopes of learning from other programs like the one being developed for the Quarry. If similar programs were found, it was hoped that they would provide information on facilities operations, materials development and/or problems that would serve as models or otherwise contribute to the Jamesville Quarry project.

Industrial Resources Survey

The industrial resources survey consisted of a letter with an enclosed, self-mailing survey sent to the top 150 corporations in the Fortune Directory[1] and four industrial associations.[2] The letters were sent to the public relations officer of the firm and inquired about environmental education programs at any of their working industrial sites. Environmental education was broadly defined, as well as "working industrial sites" (mines, manufacturing plants, distribution centers, offices, stores and other commercial locations).

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[1] The Fortune Directory of the 500 Largest US Industrial Corporations is published yearly by Fortune magazine. The list is a rank ordering of the corporations with the largest gross sales during a specified year. The list used was based on the year ending 12-31-75. (Nazem, 1976)

[2] A copy of the letter and survey and a list of the 154 corporations and associations and their responses can be found in Appendix 9, page 73.

The response rate was 37.7% (58 out of 154). Fourteen and nine-tenths percent (23 out of 154) indicated that their company sponsored some kind of education program for visitors (as opposed to in-house training). The 23 offered a mix of booklets, movies, filmstrips, slideshows, tours, speakers and displays (see Table 1).

Table 1.—Responses to Industrial Resources Survey

	number[1]	percentage[2]
no response	96	62.3
response (total)	58	37.7
no program	22	14.3
don't fill out questionnaires	5	3.2
provide speakers	1	.6
provide booklets and/or films	4	2.6
in-house program only	8	5.2
program for visitors with supporting materials	18	11.7

Of the 18 companies that sponsored visits to plants, 16 tailored each trip to the group. The other two offered standard, daily tours. All of the programs were financially supported by their respective companies. Most initial contacts were made with a public relations person. The actual tour was led by a public relations person if the company or site was large and had many visitors. Smaller companies assigned the task to various people: engineers, researchers, and public affairs staff members.

It is difficult to draw any conclusion about the real numbers of programs operated by these top 150 industries. One company responded that the "...company structure is so fragmented that it would be impossible to reply to the questions..." It is very probable that many of the 96 who did not respond were in a similar dilemma. It is also possible that individual plants may be offering educational opportunities of which the national headquarters are unaware.

[1] out of 154

[2] rounded to the nearest tenth

It does seem accurate based on the low response, lack of information in the literature and low number of such programs reported on at national environmental education meetings that few programs such as that being developed for the Jamesville Quarry exist.

Educational/Environmental Resources Survey

The educational/environmental resources survey consisted of a letter sent to the environmental education coordinators for all 50 states and the District of Columbia and all national or inter-state environmental organizations with education listed as a mission in the Conservation Directory 1976 of the National Wildlife Federation (Dysinger, 1974 and Decker, 1976).[1] The letter asked for information about environmental education programs on industrial sites (other than "nature," "outdoor," or "environmental center"). Often a state coordinator responded with the name of a person who might know more about such a program. These additional persons were contacted with a similar letter indicating that the state coordinator or organization representative had referred the researcher to him/her.

One hundred eleven inquiries were made. Forty-nine responded in some way. Table 2 below indicates the nature and number of responses.

Table 2.—Responses to Educational/Environmental Resources Survey

	number[2]	percentage[3]
no response	61	55.4
response (total)	49	44.6
have no information on environmental education programs at industrial sites	21	19.1
referred to another person or agency	19	17.3
sent information	9	8.2

[1] A copy of the letter, list of people and organizations contacted and their responses can be found in Appendix 10, page 88.
[2] out of 110(2 of the 111 organizations had combined into one)
[3] rounded to the nearest tenth

The information sent was usually a brochure about the organization's program. Nine letters contained useful comments on how programs were developed and implemented. Several of the suggestions were incorporated into the project.

Miscellaneous Local Materials

The kinds of materials located were historic articles in a company newsletter, a student slide show, movies on blasting, materials produced by the Jamesville-Dewitt School District, and a movie on reclamation. An annotated list has been compiled and included in the booklet published as part of this project: Jamesville Quarry: Resources for Teachers and Youth Leaders.

MATERIALS DEVELOPMENT AND PRODUCTION

Objective 3: Develop and produce instructional units and materials for environmental education based on the Quarry and its operation.

One overall objective of this project is to make recommendations for the development of educational materials focused on the Jamesville Quarry. Objective 3 goes beyond recommendations to actual development. The materials listed below have been published or assembled for public use. These items were chosen because of their high ratings in Round 2. Because of time and/or financial considerations, some other items with nearly as high ratings were not produced. Those items are included in the program recommendations.

1. Informational booklets on the Quarry (each booklet has a map of the Quarry on the back cover)
   - a. Geology—includes brief overview of geologic history, diagram of cross-section of rock layers, illustrations of fossils found at the Quarry, comments on other features
   - b. Trails—includes map of three hiking trails, information on mining 1911 to 1931, information on succession by plants and animals, guide to 13-station Rail Trail
   - c. Mining—descriptions and illustrations of products, complete operation (blasting, hauling, crusher, sorting, etc.), flow sheet and soda ash production chart
   - d. Reclamation—description of reclamation efforts, illustration of process, planting used, chart of tailings reclamation

2. Quarry-related activities booklets
   - a. Resources for teacher and youth leaders—includes resource list, activity ideas
   - b. Reprints of Jamesville-Dewitt School District materials—includes Learning Activity Packages for getting ready to visit the Quarry, studying resources in New York state, and selected activities from the ROCK: quarry management problem solving and field trip guide

3. Rock Box--includes the informational booklets, samples of quarry products, book of photographs of the quarry, fossils, rock samples, hard hat and safey glasses

4. Interpretive trails--John Ferrell, Reclamation Consultant, has begun work on displays for the historic trails. The Trails booklet is coordinated with this project.

Photographs were used in the Rock Box instead of slides or filmstrips because they can be passed around or posted and require no display equipment.

ALTERNATIVES AND RECOMMENDATIONS

Objective 4: Make recommendations for implementation and development of an ongoing environmental education program commensurate with the findings of the investigation.

Based on the experiences of the Jamesville-Dewitt teachers who developed materials for use at the Quarry, the preliminary report of Onondaga Nature Centers, Inc., and the entry level knowledge of the researchers, it was hypothesized that the Jamesville Quarry offered many valuable learning experiences. This study has demonstrated the wide appeal, the educational worth and the desire of educators to avail themselves of Quarry learning resources. Clearly, the Jamesville Quarry can have all the environmental education business it can handle. The question Quarry management must decide is how much time and what level of funding it can commit to environmental education at the Jamesville Quarry. Does management wish to actively encourage school and other groups or do they wish to maintain a lower profile and accommodate a more limited number only as requests are made?

There are many ways and levels possible in implementing an environmental education program at the Quarry. The most often cited are discussed below. This discussion has been divided into: Program (content, instructional format, and target age-level audiences), Staffing, and Facilities. The recommendations which follow are based on the data collected but some have been modified by the researchers. There are two reasons for this: 1.) The researchers, having a long-term acquaintance with the project and Quarry operations, felt it necessary to take into account certain information and factors to keep the recommendations in the realm of plausibility and 2.) economic considerations were not included in the study rating systems in order to permit respondents to come "as close to ideal" as they wished in their recommendations.

Program

There is something for every age level at the Jamesville Quarry. Even pre-schoolers have visited! Most of the activities highly rated for elementary and junior high ages were active, participatory ones. Older students and adults, once familiar with the site, could become involved in more complex activities. Family groups could make use of the introductory level experiences: tours of various areas, movies, hiking, etc.

The researchers' experiences as educators generally and with 21[1] quarry field trips specifically has led to a few observations regarding content and preparation for field visits. Specific learning experiences should be planned between the Quarry's environmental educator and the teachers/leaders to best meet the needs of each group and to assure that the educational experience is valid and effective. It should be noted that the most critical factor is the preparation, not age. For example, a well-prepared class of third graders will indeed learn much more than seventh graders who first hear the word "quarry" as they board the bus. The content areas most often mentioned by the study participants and visitors are land use and management, pollution control, ecology, economics, history, field natural history, geology, industrial management and mining. For most groups the first contact with Jamesville Quarry should combine several formats: an introductory movie and/or the Rock Box followed by a field trip to see the mining, reclamation, geologic and/or historic aspects of the Quarry. More in-depth learning experiences can involve individual and group research, management decision making, simulations, lectures or selected readings. Two sample outlines for Quarry learning experiences can be found on the next two pages in Table 3.

[1]Four day-long visits by study participants and 17 school/group visits. A list of the school/group visits can be found in Appendix 11, page 103.

Table 3.—Sample Learning Experiences: Fieldtrips for Cadette Girl Scouts (7th-9th Grades) and a Fourth Grade Class

Cadette (7th-9th graders) Girl Scout Field Trip

Objectives:

1. Become acquainted with a local industry
2. Complete 2 badge requirements for Rock and Mineral badge
   a. collect rock samples
   b. visit a place of geological interest and learn something of its history

Pre-visit activities:

1. Gather rock collecting equipment.
2. Read Geology booklet.
3. Examine rock samples and photographs in Rock Box.
4. Make list of questions to ask on the fieldtrip.

Visit (approximately 2 hours, allowing for driving from place to place):

1. Orientation to site (15 min)
2. Quarry floor—briefly explain mining operation (10 min)
   examine benches (10 min)
3. Fossil beds—collect samples, explore (20 min)
4. Fault near reclamation area—explain fault (10 min)
   briefly explain reclamation (10 min)
5. Reverse fault—explain formation, explore for minerals (15 min)
6. Wrap-up—final questions (10 min)

Post-visit activities:

1. Evaluate trip—scheduling, content, weather, guide, and note suggestions for future trips to Quarry or elsewhere
2. Work on parts of additional Rock and Mineral badge requirements using information learned on the trip.
3. Write thank you letters, write up trip for troop scrapbook.
4. Use knowledge/experiences from field trip for basis of other badge or challenge prep work: Write an editorial or news article for Reporter badge. Investigate environmental regulations applicable to the Jamesville Quarry for preps for the Challenge of the Environment.
5. Plan another trip: back to the Quarry, to another geologic area in contrast to the Quarry, to another local industry or business.

4th Grade Fieldtrip

Objective:

1. Examine a local industry as a case study for the development of industry in the United States.

Pre-visit activities:

1. Read booklets on trails, mining. Read other materials on quarrying in general.
2. Make a time-line with dates of significant events at the Quarry locally, nationally, and internationally.
3. Put Quarry photographs on display. Make a wall chart of the production from bench to final products and reclamation.
4. Make a list of questions to ask on fieldtrip.

Vist (approximately 2 hours):

1. Orientation (15 min)
2. Walk Mule and Rail Trails (45 min)
3. Quarry floor-see mining operation (30 min)
4. Wrap-up (10 min)

Post-visit:

1. Make a list of all things seen at the Quarry.
2. Make a chart comparing and contrasting the Quarry with other industries studied during the year.
3. Cut out pictures and/or make drawings of products using soda ash and commercial stone from the Quarry.
4. Write letters to find out answers to questions raised by trip and follow-up activites.
5. Build a model of the Quarry and equipment during recess times when weather is inclement.

The instructional content and the individual responsible for the program must have credibility with teachers and group leaders as well as with Quarry management. The researchers recommend that an advisory

committee be instituted to direct the Quarry environmental education program. This committee should be composed of Quarry management, teachers and youth group leaders, school administrators and environmental managers and scientists. Fortunately, these people are available within the community to provide this needed guidance. In the opinion of the researchers, an environmental educator working under the guidance of the committee would have a high credibility rating and would not be suspected of promoting special interest. This recommendation was not made by the study participants; the specific idea was never presented to them for evaluation. But, the need for such an advisory committee has been inferred by the researchers from the comments made by study participants as well as their personal knowledge and experience of other environmental education programs.

The focus for the content of learning experiences at the Quarry should be based on the set of materials already developed in conjuntion with this project, those developed by the Jamesville-Dewitt teachers, and the other highly rated ideas from Round 2 (these are listed below in the program recommendations).

PROGRAM RECOMMENDATIONS

1. Creation of a program advisory committee to assist in decision-making concerning program implementation, staffing, facilities, etc.

2. Use project materials (booklets on geology, trails, mining operations and reclamation) and the reprinted Jamesville-Dewitt materials as the core curricula. The materials should be expanded as recommended in #3 below.

3. Develop additional learning and resource materials to meet the needs of the visiting groups. Listed below are six specific suggestions that were highly rated by the study participants.

   a. a clear plastic overlay for the aerial photograph on on display; include labels identifying the Quarry as well as community landmarks,

   b. photos, slides or videotape of the crusher and screen house operation,

   c. copies of old, current and projected mining maps, simplified and reduced in size,

   d. information sheet on mining laws and regulations (safety and environmental),

   e. IAP's (Learning Activity Packages—a set of basic information, activities and materials to be used with the activities)—possible topics:
      - air pollution and dust control
      - mapping
      - minerals
      - blasting operation
      - microclimate studies
      - water analysis
      - core sampling
      - tailings as a recycled growth medium
      - comparing land forms created by man with naturally occuring (quarry to canyon formation, rock piles to land slides), and

   f. displays and information sheets on history of mining in general and the Jamesville Quarry specifically.

4. Teachers and group leaders should be required to participate in an introductory tour of the Quarry conducted by the environmental educator and/or other Quarry staff prior to the initiation of the instructional experience.

5. Institute prerequisite introductory learning experiences for visitors to the Quarry. More effective learning will take place if the visitors arrive knowing what they are going to experience and have already established learning objectives in mind. Booklets, Jamesville-Dewitt LAP (Learning Activity Package), materials, a 16 mm motion picture, the Rock Box and classroom visits by Quarry personnel can be employed.

6. Consider recreational activities on Quarry property.

    a. Investigate the possibilities of limited access, by pre-arrangement, to Ram's Gulch and White Lake. This would have to be done slowly and with great care as these are fragile eco-systems that could easily be destroyed with over-use.

    b. Consider opening up the trails and quarry floor for snowshoeing and/or cross-country skiing once or twice each winter.

7. Provide a budget for paper, printing, postage, materials development, reference materials, etc.

Staffing

To all intents and purposes, Jamesville Quarry has had a staff environmental education person available during the past few years. Sometimes instruction has been handled by management staff, sometimes by the reclamation consultant and sometimes by the graduate student researcher working on this project. Thus, in effect, the question of staffing is one of maintaining and/or increasing the availability of an environmental educator. If the program and staffing are not maintained, many who have availed themselves of the experience in the past will feel that they have lost an outstanding educational resource. Staffing is the sine qua non of the entire Quarry environmental education program.

In Round 2, Part I, methods of implementing a program were rated. While the results on an item-by-item basis were inconclusive, one fact came through: there needs to be a qualified person responsible for environmental education programs at the Quarry.

In addition to conducting tours, the Quarry environmental educator would have to assume peripheral responsibilities to insure maximum educational benefits. Duties would include:

1. Development of instructional materials, lesson plans, teacher guides, etc.
2. Keeping abreast of Quarry operations, industrial changes, environmental regulations, etc., so that information is always up-to-date and accurate.
3. Conducting workshops on and off the Quarry site for teachers/leaders.
4. Coordination of the Quarry's environmental education program with other school and community programs and learning resources to eliminate redundancy and foster integration.
5. Public relations for the Quarry environmental education program.

There are several alternatives for meeting this need for program direction and implementation:

Alternative 1. Employ a full-time environmental educator. This would require a substantial financial committment. Although the community could certainly use another full-time environmental educator (particularly in this area of the county), the volume of visitors to the Quarry probably does not in itself warrant a full-time position, at least initially. Visits in the past have been quite seasonal--mostly in the fall and late spring. However, if a winterized facility is ever made available, a whole new array of year-round learning activities becomes possible.
Cost estimate: $9,000-$13,000 plus benefits/year

Alternative 2. Contract with Onondaga Nature Centers, Inc. to conduct the Quarry environmental education program on the site and in schools. Under such a contract, one or two ONC staff members would become thoroughly oriented with the Quarry program: geology, resources, operation, environmental problems and solutions, economics, etc. One member of the Jamesville Quarry staff could serve as the liaison to the ONC educators to assure that the program content is accurate and representative. ONC could then conduct a specified program which would include well-publicized visitation days for teachers and group leaders in the early fall and/or spring. ONC staff could further work with teachers in developing integrated lesson plans and information brochures. In most cases, ONC staff and teachers would team to provide on-site instruction.

It should be noted that ONC contracts through BOCES (Board of Cooperative Educational Services) to provide environmental education services for many schools. The nature and commitment of these contracts should be explored and perhaps cost-sharing arrangements could be made.
Cost estimate: $70/day (one day preparation for each day of field work)

Alternative 3. Contract with an individual to perform basically the same function as discussed above. This person could be on an "as needed"

basis or contracted for a give number of programs.

Cost estimate: $40-$60/day (one day of preparation for each day of field work)

Alternative 4. Probably the least expensive alternative in hiring would be to employ graduate student interns whose background and current interests are in environmental education. Several local colleges almost always have qualified students. While this might be the least expensive alternative, there are both advantages and disadvantages. While new interns should be expected to bring fresh ideas, most would be available for no more than a year. Thus, there would be the constant need for orienting new people to the job. Also, graduate students will have classes to attend and scheduling conflicts may arise.

If an internship program is to be established, it will be important for the Quarry to have a liaison person to work with the new individual and it would be advisable to have a faculty member coordinate the program to assure that appropriate candidates are presented to the Quarry management and to maintain continuity of the program from year to year.

Quarry management may well wish to consider an internship position in combination with other alternatives. This is a frequent and successful method employed by many environmental interpretation centers (Beaver Lake, Onondaga Nature Centers, Inc., Massachusetts Audubon).

Cost estimate: $700/6-week period

Alternative 5. Employ a public relations specialist. Those providing expert opinion gave this alternative a very low rating. There is apt to be initial suspicion of the objectivity of any person coming from a profit making corporation to participate in education—especially when that person is lacking in what educators consider appropriate credentials. Teachers seem to want to work with fellow educators and/or information specialists—not those charged (if only by title) with creating a good image for their company.

Based on the opinions of survey participants and their own experience, the researchers believe that any funds spent for an additonal employee would be better spent on a well-qualified environmental educator rather than a public relations person.
Cost estimate: $9,000-$13,000 plus benefits/year

Alternative 6. Use Jamesville Quarry staff to conduct visitors' field trips. This is essentially the current situation. But, during the past three years the Quarry has been fortunate in having the reclamation consultant and research associate on site and often available to participate in educational activities.

While this alternative appears to be the least expensive one, there are hidden costs which should be considered. A manager or foreman diverted from other duties may be a very expensive alternative. Because visits must be scheduled well in advance and because so many Quarry activities require immediate action by managerial staff, conflicts are bound to arise. Further, Quarry management cannot be expected to have the expertise nor to be able to devote the time to developing valid learning experiences in concert with teachers and group leaders so that integrated learning takes place from classroom or group meeting to the Quarry and back again. Quarry personnel certainly have the advantage of knowing the operation and should always be available as resource people.

Cost estimate: N/A

Please note that the dollar figures after each alternative are an approximation only--based on current information from professionals in the field. In addition to the professional staff, some secretarial help would have to be provided to accommodate staff needs.

STAFFING RECOMMENDATIONS

The researchers recommend employment of a part-time environmental educator at this time. At least initially, we believe that continuity and development require an individual—not several different individuals depending on schedule availabilities.

It is recommended that an initial contract be for a period not to exceed one year with agreed upon evaluation criteria established at the time of contract. At the end of the first year of operation, the advisory committee (see above) and Quarry management should review the program and the person. From this evaluation, subsequent program planning should develop taking into account appropriate adjustments (staff time, priorities, numbers to be served, etc.).

While the researchers do not recommend graduate student interns for primary staffing, internship positions are highly recommended for back-up and assistance staffing. This way more than one group (or more than one vehicle for tours) can be accommodated at any one time and the primary staff person can delegate some work activities thus permitting more time to be devoted to program development, teacher/leader training, evaluation, etc.

A qualified environmental educator should be retained for approximately 70 work days to be divided as appropriate between scheduling, teacher orientation, etc. and site visits.

Facilities

Visitor facilities for the Quarry environmental education program should be commensurate with the level of the program. And, while it would be ideal to have an interpretive building with displays and laboratory facilities, elaborate learning resources and special vehicles to traverse the Quarry property, this does not appear practical, at least initially. Thus, this discussion will be limited to minimal facilities options appropriate to handling school and other groups on a day-use basis.

Currently facilities for visitors are somewhat limited, consisting of only a picnic table by the Rail Trail and access to the small conference room in the main office building (when not otherwise scheduled). Rest rooms in the main office are also used but this is quite disruptive for the staff. For the immediate future it is possible to conduct environmental education learning activities without the investment in further building facilities. However, while the Quarry educational visit is outdoor by nature, some sort of shelter should be provided for inclement weather and to conduct orientation sessions. Also, rest room facilities should be available.

As the program matures, Quarry management should re-evaluate commitment to more permanent facilities. Perhaps it would be appropriate to construct an inexpensive pole-barn type building which might later be winterized and could very conceivably become a facility to accommodate additional Quarry and community needs in that area of the county. Programmatic and fiscal consideration should be given to modifying and using facilities employed by the YMCA summer camp on the eastern boundary of the Quarry property for overnight options or studies involving comparative field natural history.

As noted in earlier sections, virtually all visits to the Quarry should begin with some kind of orientation. Aerial photographs, maps, product samples, core samples, safety considerations, historical

perspective and other information should be presented in the orientation session. Holding this orientation outdoors can be a problem. The new sights and sounds of the Quarry are very interesting and distracting. An orientation can be given on the group's bus or standing outside by the office but that is less than adequate. The three options seem to be using the conference room when it is available, converting exisiting facilities (such as underused office space) to an environmental education meeting room and office, and building a new facility.

As noted above, the Quarry environmental education program can continue with only minimal facilities additions. More permanent facilities would be desirable but would necessitate a considerable capital outlay. Thus, it is recommended that consideration of additional building facilities be put in abeyance until after the first year of program operation. It is the judgement of the researchers that the first need in funding is for staff and that facilities funding should follow.

FACILITIES RECOMMENDATIONS

1. Acquire hard hats and safety glasses specifically for the use of Quarry visitors. Hard hats should be stenciled to identify them as belonging to Jamesville Quarry and as part of the environmental education program.

2. Develop a communications mechanism for informing appropriate Quarry personnel when visitors can be expected and informing the environmental educator (and other group leaders) what areas should be avoided or when special conditions prevail.

3. Provide access to either the small conference room in the new office building (to accommodate groups of up to 25) and/or revise office arrangements to make the "old conference room" available (groups of approximately 30). Window darkening should be provided to accommodate slides or movies, a permanent wall projection screen should be installed, cabinets for storage of booklets, worksheets, demonstration materials, etc. should be available and a chalk board and bulletin board should be installed. It should be noted that so long as the Quarry environmental education program is seasonal, this would constitute only a temporary commitment for this (or these) rooms. It is assumed that the Quarry environmental education staff would, or could, use the same area for an office.

4. Provide temporary rest room facilities. Initially, portable chemical toilets (most likely in the trail area) and gravity-feed water containers for washing hands would be adequate.

5. Set aside a small, recently mined area for studies and experiments by visiting groups.

6. Provide three or four picnic tables and a trash receptacle in the shade near the Mule Trail for picnic lunches and student work space.

The Quarry Project as a Model

It is the intent of the researchers that, in addition to providing a blueprint for the Jamesville Quarry Environmental Education program, we have provided a model for others to use in developing their own environmental education programs centered around industrial sites.

What kinds of sites are appropriate for an environmental education program (and can use this model in their development)? Any site that is safe for and accessible to visitors is appropriate. All industrial sites, in some way or another, take raw materials (rock, electronic components, ideas), do something to/with them (mine, assemble, develop), and pass them on (train, truck, report). The process can be studied as a complete system or an element of a larger one with as many spin-offs (fossil hunts, history of transistor, writing a story: "Why I Want/Don't Want To Be An Advertising Executive") as there are visitors to the site.

The most important elements of this model are the site visits and subsequent evaluations by people with a wide variety of experiences and education. A great effort was made to include representatives from all potential user groups. This goal should be uppermost in the mind of anyone seeking to develop a similar program. By seeking out potential users and involving them in the development, several things are accomplished:

People become aware of the project and the site operation. Before the project began, three to five groups visited the Quarry yearly. During 1977, 21 groups visited the site. People often have stereotypes about industrial operations. When the 50 participants in the study visited the Quarry, they were asked (anonymously) to state what their feelings about the Quarry had been when they arrived and, if their feelings had changed, how they felt at the end of the day. Each

response was rated as being positive, negative, neutral, or a mixture. Of the 50 participants, 26 had a change of opinion and all 26 were positive.

The expertise of educators, environmental scientists, researchers, youth leaders, and community leaders becomes available to the program developers. No matter how skilled or educated, one or two staff members can not know all there is to know about a site and its potential. When an educational program is being developed, the more expert help, the better. By inviting members of the community to the site, the pool of knowledge is increased, the community people have a stake in the program and the program developers can learn what kind of program would best suit community needs.

Also, as discussed above, the project is given credibility by the participation of people not associated with the day to day operations of the site. This is especially true when the participation is formally made into an advisory board or council.

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Appendixes

APPENDIX 1

STUDY PARTICIPANTS

Table 4 — Participants in Study

Name[1]	Position/Organization
Nancy Alliare	graduate student, Educational Communications SUNY College of Env. Science and Forestry
Jim Barnello	teacher, Genesee Hills Elementary School, Jameville-DeWitt School District
Ed Carey	graduate student, Science Teaching Dept. Syracuse University
Bob Catney	principal, Jamesville Elementary School Jamesville-DeWitt School District
Ken Clark	teacher, Van Buren School, Baldwinsville School District
Jean Colby	Environmental Educator, Onondaga Nature Centers, Baldwinsville, New York
Sandy Cooper	teacher, Pine Grove Middle School, East Syracuse-Minoa School District
Shirley Crawford	Biology Department, SUNY Morrisville
Teri Culhane	teacher, Jamesville-DeWitt Middle School, Jamesville-DeWitt School District
Ros Dalia	teacher, Herkimer High School, Herkimer
Nancy Detotto	teacher, Enders Road School, East Syracuse-Minoa School District
Judy Dombert	teacher, Woodland School, East Syracuse-Mino School District

[1] Names as given on questionnaire

Name	Position/Organization
Elizabeth Dunford	teacher, Rockwell Elementary School, Onondaga Central School District
Charles Durr	administrator, science programs, Syracuse City School District
Laurie Ellison	teacher, Pine Grove Middle School, East Syracuse-Minoa School District
Marilyn Fleming	teacher, LaFayette School, LaFayette Central School District
Barb Genton	teacher, Driver Middle School, Marcellus Central School District
Bill Haber	principal, Longbranch Elementary School, Liverpool Central School District
Austin Hamer	Continuing Education, SUNY College of Environmental Science and Forestry
Dave Harper	Landscape Architecture, SUNY College of Environmental Science and Forestry
Shirley Harrison	Youth Development, PEACE, Inc., Syracuse, New York
Nancy Haswell	teacher, Jamesville Elementary School, Jamesville-DeWitt School District
Betsy Knapp	Manlius Environmental Commission Manlius, New York
Jim Kundell	graduate student, Environmental Science, SUNY College of Env. Science and Forestry
Bill Legg	science supervisor, Liverpool High School, Liverpool Central School District
John Loosman	teacher, Wellwood Middle School, Fayetteville-Manlius School District
Gloria Mabie	teacher, Eagle Hill Middle School, Fayetteville-Manlius School District

Name	Position/Organization
Paul Markovits	Adjunct professor, Onondaga Community College
Millie McNeill (Grimes)	teacher, Green Street Middle School, Cazenovia Central School District
Ernie Muller	Geology Department, Syracuse University
Richard Nichols	Burton Street School, Cazenovia Central School District
Ossie Nye	Geology and Science Teaching Departments, Syracuse University
Allan Olson	teacher, Durgee Junior High School, Baldwinsville School District
Jerry Passer	Department of Environmental Conservation, Albany, New York
Mary Pinkerton	teacher, East Syracuse-Minoa High School, East Syracuse-Minoa School District
Doris Pettman	teacher, Lyncourt School, Lyncourt School District
Lynn Pyke	field director/camp director, Central New York Girl Scout Council, Inc., Syracuse, NY
Dave Reider	graduate student, Educational Communications SUNY College of Env. Science and Forestry
Roxie Ridall	teacher, Pine Grove Middle School, East Syracuse-Minoa School District
Bill Ritz	Environmental Studies Institute and Science Teaching Department, Syracuse University
Sister Mary Esther	Biology Dept., Maria Regina College, Syracuse, New York
Sister Mary Jerome	Biology Dept., Maria Regina College, Syracuse, New York
Lu Spencer	graduate student, Educational Communications SUNY College of Environmental Sci. and For.

Name	Position/Organization
Neil Stevens	Special Projects, Syracuse City School District
Mike Storey	Superintendent, Beaver Lake Nature Center, Baldwinsville, New York
Greg Trombley	teacher, Morgan Road Elementary School, Liverpool Central School District
Al Vaccaro	teacher, Onondaga Road Elementary School, West Genesee School District
John Weeks	Director, Onondaga Nature Centers, Inc., Baldwinsville, New York
Betty Wilcox	teacher, Pompey School, Fabius-Pompey Central School District
Charlie Yaple	Recreation Department, SUC Cortland

APPENDIX 2

STUDY NON-PARTICIPANTS

It was thought possible that the people who were invited to participate in the project, but did not, may have felt that the quarry was not a useful learning resource. Therefore, a follow-up survey was mailed. The responses to that mailing were combined with responses from postcards (indicating that the person would not be able to attend) to yield the information in the table below.[1] This information indicates that those not participating were not refraining because of a judgement about the usefulness of the Quarry for educational purposes.

Table 5. —Responses to Follow-up Survey

	number[2]	percentage[3]
attended	50	39.7
did not attend	76	60.3
no response to follow-up survey	10	7.9
said they would attend, but didn't	3	2.4
illness or family emergency	3	2.4
other commitments or didn't have time	34	27.0
couldn't get time off from work	9	7.0
moved	3	2.4
lost or never received information	5	4.0
already familiar with quarry[4]	4	3.2
didn't think it was a useful resource	1	.8
not interested in helping to develop but might use in future	4	3.2

[1] postage was provided

[2] out of 126

[3] rounded to the nearest tenth

[4] of these four, three agreed to fill out questionnaires, but none were returned

APPENDIX 3

TOUR SCHEDULE FOR STUDY PARTICIPANTS

Visits took place on the following dates:

May 22, 1976,
June 1, 1976,
June 2, 1976, and
October 18, 1976.

The schedule below was the basic format, with adaptions for the weather and size of the group.

9:00 AM	Welcome, introduction, coffee, background on quarry and project
9:30 AM	Bus tour of Quarry pit operations (mining, spoils piles, blasting) and fossils
11:00 AM	Bus tour of crusher, commercial stone piles, and tailings pond
12:00 PM	View blasting of stone bench
12:30 PM	Lunch
1:15 PM	Walking tour of historic trail and unmined area
2:30 PM	Final questions, passing out questionnaires

APPENDIX 4

ROUND 1: WORKSHEET

Note: The instructions for this worksheet were given orally. It was intended to be a basis for brainstorming ideas. The participants saw all the places/items on the sheets.

All communications received are strictly confidential. Names are requested for statistical and operational purposes only.

1. Name:

2. Education: 8th 12th some college Bachelor Master PhD PhD+

Please circle appropriate level completed

3. Please describe briefly your:

Paid work (if any):

Volunteer work (if any):

Other interests:

Possible areas of interest to explore via the Quarry:

Management
- decision making
- planning

Government
History
Culture
Sociology
Sciences
- ecoscience
- geoscience

Math
Language Arts
- reading
- writing
- speaking

Arts
- music
- visual
- drama

Multi-disciplinary studies

QUARRY RESOURCES

Blast and blasters

Business operations (local economy)

Commercial stockpiles

Crusher

Hiking trails

Machinery

Personnel: Mining
Crushing & Shipping
Maintenance
Management

Quarry floor

Quarry Walls

Railroad

Reclamation areas: Natural
Man-assisted
Test plots

Spoils piles (overlooks)

Tailings pond and tailings

Unmined areas

Other resources

Comments:

APPENDIX 5

ROUND 2, PART I: QUESTIONNAIRE, DISCUSSION AND RESULTS

PART I

You have 15 credits to spend for your annual budget for the Jamesville Quarry Environmental Education Program. Indicate how you would spend it by writing the number of credits before each item. Items that would never be included in your budget should have an "X" placed in the space.

___publish guides, informational booklets

___provide bus transportation from "home" to site

___provide bus transportation around the Quarry

___produce pre-visit materials

___produce post-visit materials

___hire full time educator

___hire full time public relations consultant

___construct museum exhibits

___build visitor's facilities: meeting room, display area, rest rooms

___equip on-site lab for student use

___produce materials for off-site use (in leiu of a visit to the Quarry)

___produce project materials for multiple-visit use

___contract to another organization/agency for educational services

___develop outdoor interpretive displays, trails

___buy equipment for field studies

___other:_____

****

Is the Jamesville Quarry an educationally valuable resource? ___yes ___no

****

Participants ranked methods of implementing a program by "spending money" on various choices. Each had 15 credits to spend for an annual budget for the Jamesville Quarry Environmental Education Program. This format allowed greater flexibility that a simple rank ordering. A person could heavily weight one or two items or spread the credits—and value—over several items. The results are in the table below.

Table 6.—Round 2, Part I Questionnaire Results

rank	mean credits spent [1]	item
1	2.60	develop outdoor interpretive displays, trails
2	2.38	produce pre-visit materials
3	2.30	hire full time educator
3	2.30	construct museum exhibits
3	2.30	buy equipment for field studies
4	2.25	publish guides, informational booklets
5	2.20	provide bus transportation around quarry
6	2.15	produce post-visit materials
7	2.10	build visitor's facilities: meeting room, display area, rest rooms
8	1.80	produce materials for off-site use
9	1.60	equip on-site labe for student use
10	1.59	produce project materials for multiple-visit use
11	.90	contract to another agency/organization for educational services
11	.90	provide bus transportation from "home" to site
12	.60	hire full time public relations consultant

[1] rounded to nearest hundredth

APPENDIX 6

ROUND 2, PART II: QUESTIONNAIRE SAMPLES, DISCUSSION AND RESULTS

PART II

On the rest of this questionnaire, you will find a series of blocks like the ones below. The process is a very rapid and simple one. Simply rate each item, by age level, for its importance in being included in the quarry program. If you feel that something would actually be detrimental, please put an "X" through the box, as shown below. If there is an idea that has not been included, and you think it should be, there are blanks at the end.

Thank you!

4—it is very important that this item be included

3—it is fairly important

2—it is somewhat important

1—it is not important at all

0—outside the area you feel confident in rating

EXAMPLES:

4-very important 1-not important at all 0-no comment	pre-school	elementary	jr.high school	high school	college	adult
(at a nature center) snow shoeing	4 3 2 **1** 0	4 **3** 1 0	**4** 3 2 1 0	**4** 3 2 1 0	**4** 3 2 1 0	**4** 3 2 1 0
(at a power plant) tightrope walking (barefoot) on a utility line in a rainstorm	4 3 2 1 **0**	4 3 2 1 **0**	4 3 2 1 **0**	4 3 2 1 **0**	4 3 2 1 **0**	4 3 2 1 **0**
(at a park) providing swings with safety bars	**4** 3 2 1 0	4 **3** 1 0	4 3 2 **1** 0	4 3 2 **1** 0	4 3 2 **1** 0	4 3 2 **1** 0

4-very important 3-fairly important 2-somewhat important
1-not important at all
0-no comment

********INTERPRETIVE TRAILS, TOURS********INTERPRETIVE TRAILS, TOURS********

	pre-school	elementary	jr.high school	high school	college	adult
1.look at reclamation: man-assisted and natural	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
2.develop a trail in Ram's Gulch	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
3.students decide on a theme and design a walk	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
4.open up trails in White Lake area	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
5.tour mining areas	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
6.visit overlooks: explain regional physiography--lake plain, escarpment, glacial geology, etc.	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
7.use minibus and offer well-publicized, daily tours	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
8.short train ride on old locomotive	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0

Each of the 107 items in the Round 2, Part II questionnaire was evaluated six different times—one for each age level—and one overall figure for the item was computed. Each age level had a different mean and a different standard deviation:

age level	mean	standard deviation
preschool	1.102	.389
elementary	1.812	.552
junior high	2.395	.547
high school	2.732	.526
college	2.851	.601
adult	2.543	.573.

In order to compare the ratings of different age levels within the item and to compare different items, a common scale was needed. Standard deviations were used. An item two standard deviations above the mean received the highest ranking—a 6—while an item two standard deviations below the mean received the lowest ranking—a 1:

Rank	Distance from the mean
1	2 or more standard deviations below the mean
2	1 to 2 standard deviations below the mean
3	1 standard deviation below the mean to mean
4	mean to 1 standard deviation above the mean
5	1 to 2 standard deviations above the mean
6	2 or more standard deviations above the mean

Table 7.—ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch	elem.	jr.hi	high	college	adult	overall
1. look at reclamation: man assisted and natural	1.49 4	2.81 5	3.58 6	3.78 6	3.84 5	3.82 6	3.22 6
2. develop a trail in Ram's Gulch	1.64 5	2.65 5	3.14 5	3.14 4	3.11 4	3.14 5	2.80 5
3. students decide on a theme and design a walk	0.97 3	1.81 3	2.70 4	3.14 4	2.72 3	2.14 3	2.25 4
4. open up trails in White Lake area	1.97 6	2.73 5	3.19 5	3.25 5	3.23 4	3.33 5	2.95 5
5. tour mining area	1.53 5	2.56 5	3.32 5	3.53 5	3.65 5	3.59 5	3.03 6
6. visit overlooks: explain regional phisiography—lake plain, escarpment, glacial geology, etc.	0.97 3	2.03 4	3.24 5	3.76 5	3.84 5	3.68 5	2.92 5
7. use minibus and offer well-publicized daily tours	0.94 3	1.63 3	1.94 3	2.19 2	2.71 3	2.94 4	2.06 3
8. short train ride on old locomotive	2.30 6	2.71 5	2.41 4	1.84 2	1.75 2	1.95 2	2.16 3
9. long term study of test plot—can make own or photographic study of existing	0.97 3	1.24 2	1.91 3	2.97 4	3.56 5	2.41 3	2.18 3
10. investigate geology: strike and dip, outcrops, faulting, fossils, etc.	0.92 3	1.76 3	2.82 4	3.50 5	3.70 5	2.92 4	2.60 4

[1] These numbers correspond with the values 1, 2, 3, and 4 on the questionnaire.
1—not important at all 2—somewhat important 3—fairly important 4—very important

[2] Mean and standard deviation by grade:

age level	mean	standard deviation
preschool	1.102	0.389
elementary	1.812	0.552
junior high	2.395	0.547
high school	2.723	0.526
college	2.851	0.601
adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
11. explore machinery, climb into trucks	2.50 6	2.97 6	2.62 4	2.15 2	1.74 2	1.36 1	2.22 3
12. sound and seismic monitoring studies	0.86 3	1.34 3	2.00 3	2.89 4	3.44 4	2.59 4	2.19 3
13. air pollution study, dust settling patterns	0.86 3	1.62 3	2.53 4	3.34 5	3.70 5	3.00 4	2.51 4
14. quantity and volume studies (rock, crushed stone, etc.)	0.82 3	1.76 3	2.35 3	2.86 4	2.72 3	2.49 3	2.17 3
15. investigate and classify minerals	0.89 3	2.03 4	2.86 4	3.35 5	3.50 5	2.94 4	2.60 4
16. mapping: overall Quarry or portions, sources of stone, old mining areas	0.89 3	1.72 3	2.68 4	2.97 4	3.03 4	2.45 3	2.29 4
17. investigate blasting operations—how, what, physics of blast, history of blasting in quarry	0.94 3	1.78 3	2.62 4	3.16 4	3.39 4	3.05 4	2.49 4
18. compare mined areas with unmined; quarry with other areas using micro-climate techniques	0.94 3	1.72 3	2.72 4	3.32 5	3.56 5	2.69 4	2.49 4

[1] These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
1—not important at all 2—somewhat important 3—fairly important 4—very important

[2] Mean and standard deviation by grade:

age level	mean	standard deviation
preschool	1.102	0.389
elementary	1.812	0.552
junior high	2.395	0.547
high school	2.732	0.526
college	2.851	0.601
adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
19. study old machines, parts for junk-yard archeology	1.00 3	1.64 3	2.32 3	2.29 3	2.36 3	2.06 3	1.95 3
20. set aside a mined area for people to use as an experimental site	1.06 3	1.65 3	2.33 3	3.03 4	3.39 4	2.59 4	2.34 4
21. live at the Quarry for 2 days, learn to adapt to different environments, how to cope with lack of natural resources, pack and carry supplies	0.86 3	1.54 3	2.38 3	2.50 3	2.51 3	1.97 3	1.96 3
22. sessions for teachers, others, on what's available at the Quarry, how to use	2.15 6	3.31 6	3.64 6	3.64 5	3.75 5	3.23 5	3.29 6
23. water analysis of ponds and creeks in area	0.91 3	1.86 4	2.81 4	3.39 5	3.56 5	2.69 4	2.54 4
24. sampling studies--use cores	1.00 3	1.59 3	2.59 4	3.26 5	3.56 5	2.59 4	2.43 4
25. visit Quarry in various seasons, draw, photograph for comparison	1.46 4	2.41 5	2.78 4	2.81 4	2.64 3	2.28 3	2.40 4
26. study plants: life requirements, succession	1.22 4	2.51 5	3.24 5	3.54 5	3.58 5	2.92 4	2.84 5

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age level	mean	standard deviation
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ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
27. study wildlife: type, life requirements, signs of existence (tracks, scats)	1.72 5	2.79 5	3.26 5	3.11 4	3.14 4	2.65 4	2.78 5
28. soil studies: analyze and compare with other areas, compare plant life	0.97 3	1.71 3	2.70 4	3.27 5	3.53 5	2.39 3	2.43 4
29. use old homestead sites, dumps for archeological sites	0.97 3	1.89 4	2.43 4	2.73 4	2.89 4	2.33 3	2.21 3
30. photographs of drilling, blasting, geological formations, stone sorting, tailings cycle, etc.	1.09 3	2.00 4	2.57 4	2.65 3	2.89 4	2.75 4	2.32 4
31. mining history of the Quarry/Central New York, restore artifacts, machinery	0.88 3	1.89 4	2.54 4	2.73 4	2.92 4	2.73 4	2.28 4
32. maps at overlooks and displays along trails	1.31 4	2.56 5	3.26 5	3.29 5	3.22 4	3.34 5	2.83 5
33. portable exhibits to circulate (primarily to schools)	1.65 5	2.63 5	2.95 5	2.79 4	2.41 3	1.84 2	2.38 4
34. pictures of uses of commercial and chemical stone	1.47 4	2.21 4	2.65 4	2.81 4	2.77 3	2.81 4	2.45 4

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1—not important at all 2—somewhat important 3—fairly important 4—very important

[2] Mean and standard deviation by grade:

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preschool	1.102	0.389
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ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
35. commercial stone—why there, cost structure, major users and uses	0.88 3	1.62 3	2.22 3	2.76 4	3.19 4	3.05 4	2.29 4
36. investigate mining history of Quarry, Central New York, other limestone quarries, changes over time	0.89 3	1.61 3	2.49 4	2.79 4	3.08 4	2.78 4	2.27 4
37. investigate different parts of the operation such as commercial stone, chemical stone, maintenance program, and make flow charts, picture ordering cards	0.85 3	1.49 3	2.16 3	2.71 3	3.00 4	2.53 3	2.12 3
38. interview employees for career information	0.91 3	1.51 3	2.30 3	3.05 4	2.78 3	2.13 3	2.12 3
39. cost/benefit studies for reclamation, new equipment, different fuels, truck vs. trains, industry vs. no industry, etc.	0.74 3	1.13 2	1.89 3	2.65 3	3.17 4	2.62 4	2.03 3
40. investigate the Quarry and its relationship with the community: history of relationship, current attitudes	0.97 3	1.70 3	2.35 3	3.14 4	3.53 5	3.35 5	2.51 4

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[2] Mean and standard deviation by grade:

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ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
41. investigate laws and regulations and how the Quarry complies (safety, environmental)	0.86 3	1.45 3	2.43 4	3.16 4	3.56 5	3.49 5	2.49 4
42. compare man's environmental changes with natural processes: Quarry to canyon formation; dump slopes to rock slides; crushing, sorting, washing to erosion	0.97 3	1.95 4	2.92 4	3.36 5	3.54 5	3.06 4	2.63 5
43. examine Quarry as a total system of inputs, outputs, and impacts	0.83 3	1.43 3	2.19 3	2.92 4	3.44 4	2.97 4	2.30 4
44. investigate reclamation—define, criterion, goals, values, other approaches, other quarries	0.76 3	1.39 3	2.29 3	2.81 4	3.23 4	3.00 4	2.25 4
45. study Quarry master plan, project what area will look like in 1980, 1990, 2000, etc.	0.91 3	1.70 3	2.31 3	2.84 4	3.22 4	3.11 4	2.35 4
46. compare past with present operational efficiency, land used/year, environmental considerations, economy, product demands, etc.	0.79 3	1.29 3	1.89 3	2.72 3	3.14 4	2.97 4	2.13 3

[1] These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
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ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
47. search land title history in county court house	0.74 3	0.95 2	1.38 2	1.92 2	2.33 3	1.89 2	1.54 2
48. trace family histories of employees, compare with US immigration and settling history	0.79 3	1.33 3	1.78 2	2.06 2	2.11 2	1.81 2	1.65 2
49. English/Science lessons on dichotomies: hard/soft, sandstone/limestone, old/new	1.26 4	1.92 4	2.33 3	2.47 3	2.17 2	1.89 2	2.01 3
50. investigate recycling: tailings, machinery, other industrial waste	0.94 3	1.76 3	2.59 4	3.19 4	3.42 4	2.97 4	2.48 4
51. investigate Quarry as a system: hairarchy of staff, salaries, numbers of people, how to progress	0.74 3	1.16 2	1.62 2	2.30 3	2.89 4	2.32 3	1.84 2
52. study Quarry production: crushed, mined, commercial and chemical uses, compare over time	0.77 3	1.22 2	1.97 3	2.33 3	2.83 3	2.47 3	1.93 3
53. using aerial maps, study land use changes over time in Quarry and surrounding area	0.76 3	1.56 3	2.44 4	3.00 4	3.31 4	2.89 4	2.33 4

[1] These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
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[2] Mean and standard deviation by grade:

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adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
54. investigate geologic history, formation, on-site phenomena	0.91 3	1.83 4	2.66 4	3.29 5	3.56 5	2.71 4	2.49 4
55. investigate history, current use, and future use of railroads at the Quarry	1.03 3	1.57 3	2.08 3	2.33 3	2.63 3	2.41 3	2.01 3
56. investigate decision-making process at the Quarry	0.76 3	1.11 2	1.67 2	2.17 2	3.00 4	2.89 4	1.93 3
57. compare open-pit vs. underground mining: cost, community feeling, environmental problems, viability	0.74 3	1.24 2	1.92 3	2.51 3	3.03 4	2.89 4	2.05 3
58. study inventions (and inventors) especially made for quarrying, compare old and new equipment	0.88 3	1.67 3	2.20 3	2.17 2	2.06 2	2.00 3	1.83 2
59. safety at the Quarry	1.71 5	2.70 5	3.11 5	3.05 4	3.03 4	3.19 5	2.80 5
60. cost/benefits: trade-offs and societal (or local) goals	0.74 3	1.27 3	1.84 2	2.44 3	2.83 3	2.69 4	1.97 3
61. discuss theoretical equations such as: $\frac{\text{acres of Quarry} \times \text{yrs. of operation}}{\text{environmental management}}$	0.70 2	1.06 2	1.49 2	2.11 2	2.51 3	2.23 3	1.68 2

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preschool	1.102	0.389
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adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
62. study possible uses for things like skating, a stadium, etc.	1.00 3	1.50 3	2.11 3	2.74 4	2.91 4	2.86 4	2.19 3
63. family picnic areas	1.8. 5	2.12 4	2.27 3	2.06 2	2.06 2	2.32 3	2.11 3
64. use walls to learn to rappel, rock climb	0.88 3	1.39 3	1.79 2	2.24 3	2.82 3	2.61 4	1.96 3
65. overnights at Camp Iroquois, old Boy Scout Camp	1.30 4	2.58 5	3.00 5	2.78 4	2.09 2	1.80 2	2.26 4
66. set up orienteering course	1.07 3	1.70 3	2.25 3	2.56 3	2.53 3	2.42 3	2.09 3
67. set up cross-country/snow shoeing trails	1.03 3	2.00 4	2.82 4	2.94 4	3.09 4	3.26 5	2.52 4
68. golf course with rock areas as obstacle obstacles and sponsor Allied Chem.Open	0.67 2	0.76 2	1.07 1	1.34 1	1.66 2	2.03 3	1.25 1
69. set up snowmobiling trails	0.82 3	1.00 2	1.83 2	2.22 3	2.23 2	2.52 3	1.77 2
70. investigate environmental effect of using $CaCl_2$ on roads for dust control	0.76 3	1.03 2	1.71 2	2.53 3	3.26 4	2.61 4	1.98 3
71. study exothermic and endothermic reactions, chemistry of explosives	0.74 3	0.91 2	1.33 2	2.29 3	3.03 4	2.11 3	1.74 2

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[2] Mean and standard deviation by grade:

age level	mean	standard deviation
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adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
72. put together a kit of different rock samples, testing materials and experiment guide	1.15 4	2.49 5	3.14 5	3.47 5	2.89 4	2.36 3	2.58 4
73. experiment with sediments to determine what plants will grow, what additional materials must be added to sediment	1.03 3	1.91 4	3.00 5	3.49 5	3.66 5	2.60 4	2.61 4
74. develop management plan, make decisions in given situations, compare with actual decisions	0.76 3	1.09 2	1.85 3	2.40 3	3.06 4	2.51 3	1.95 3
75. design and construct miniature geologic column using quarry rock	0.86 3	1.58 3	2.26 3	2.61 3	2.60 3	2.28 3	2.03 3
76. high school/college apprentice or intern program	0.63 2	0.74 2	0.90 1	2.71 3	3.15 4	1.75 2	1.65 2
77. miniature working model of quarry machinery and operation	1.74 5	2.29 4	2.23 3	2.11 2	2.09 2	2.03 3	2.08 3
78. act out part of quarry history or conflicts	1.09 3	1.58 3	1.74 2	2.06 2	1.91 2	1.60 2	1.66 2
79. make dioramic constructions to show different environments: formation, _____ mining, now	1.26 4	2.06 4	2.77 4	2.91 4	2.46 3	1.97 3	2.24 4

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ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
80. simulate purchase of machinery, compare with actual purchases	0.75 3	1.09 2	1.53 2	1.85 2	1.82 2	1.49 2	1.42 1
81. hold simulated town meetings, debates, hearings, board meetings, moot courts on environmental or management issues	0.79 3	1.51 3	2.53 4	3.09 4	3.11 4	2.37 3	2.23 3
82. use the Quarry as a case study for growth of an industry	0.82 3	1.40 3	2.00 3	2.38 3	2.54 3	2.06 3	1.85 2
83. develop community relations proposals, submit to management for reaction and comments	0.75 3	1.03 2	1.42 2	2.18 2	2.64 3	2.91 4	1.82 2
84. monopoly type land use game with different types of housing, land use, penalties, etc.	0.79 3	1.58 3	2.03 3	2.03 2	1.89 2	1.92 2	1.71 2
85. guide books to geology, plants, animals	1.37 4	2.54 5	3.14 5	3.36 5	3.37 4	3.33 5	2.85 5
86. land use map of the Quarry	1.11 4	2.22 4	2.89 4	3.22 4	3.40 4	3.03 4	2.64 5
87. booklet which explains quarry operations and products	1.20 4	2.06 4	2.83 4	3.14 4	3.17 4	3.27 5	2.61 4

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adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.		elem.		jr. hi		high		college		adult		overall	
88. filmstrip or slide show which explains quarry operations and products	1.31	4	2.51	5	3.19	5	3.17	4	3.06	4	3.25	5	2.75	5
89. maps for visitors	1.16	4	2.18	4	3.05	5	3.24	4	3.44	4	3.49	5	2.76	5
90. bibliography of studies and information about the Quarry	0.76	3	1.23	2	2.25	3	2.91	4	3.35	4	3.09	4	2.27	4
91. materials explaining place of Quarry in local and national economies	0.82	3	1.29	3	2.15	3	2.50	3	2.94	4	3.06	4	2.13	3
92. transparent overlay for aerial photograph in conference room with labels	1.09	3	2.03	4	2.71	4	2.97	4	3.23	4	3.11	4	2.52	4
93. slide or filmstrip program with sound and dialogue for auditory skills or with captions for reading skills	1.26	4	2.43	5	2.56	4	1.97	2	1.71	2	1.69	2	1.93	3
94. reclamation film available and revised to keep up-to-date	1.11	4	2.03	4	2.69	4	2.97	4	3.18	4	3.20	5	2.53	4
95. slide show of quarry history with people wearing clothes of the time showing artifacts	1.57	5	2.43	5	2.58	4	2.33	3	2.26	3	2.31	3	2.25	4
96. prints or slide show of historical photographs	1.35	4	1.97	4	2.47	4	2.54	3	2.68	3	2.83	4	2.31	4

[1] These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
1—not important at all 2—somewhat important 3—fairly important 4—very important

[2] Mean and standard deviation by grade:

age level	mean	standard deviation
preschool	1.102	0.389
elementary	1.812	0.552
junior high	2.395	0.547
high school	2.732	0.526
college	2.851	0.601
adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch	elem.	jr. hi	high	college	adult	overall
97. "activity packages" with facts and ideas for projects, activities, for various ages for crusher, stone, mining process, etc.	1.53 5	2.62 5	3.08 5	2.89 4	2.14 2	1.77 2	2.34 4
98. film of crusher and screen house	1.39 4	2.22 4	2.58 4	2.47 3	2.34 3	2.50 3	2.25 4
99. story or coloring book about history of the Quarry	2.33 6	2.81 5	1.78 2	1.26 1	1.15 1	1.26 1	1.76 2
100. stone sculpture on walls, blasting provided by the Quarry	1.04 3	1.34 3	1.79 2	2.10 2	2.21 2	1.80 2	1.71 2
101. political style cartoons about quarry issues, pro and con	0.79 3	1.11 2	1.82 2	2.29 3	2.20 2	2.03 3	1.71 2
102. draw and paint with quarry environs as subject	1.74 5	2.51 5	2.60 4	2.56 3	2.21 2	1.94 2	2.26 4
103. use different-sized rock for mosaic	1.83 5	2.34 4	2.53 4	2.37 3	2.14 2	1.78 2	2.17 3
104. photography—especially detail and perspective studies; photo essays	0.94 3	1.47 3	2.15 3	2.83 4	2.80 3	2.46 3	2.11 3
105. compose music evocative of quarry sounds	1.23 4	1.60 3	1.85 3	2.09 2	2.12 2	1.63 2	1.75 2

[1]These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
1—not important at all 2—somewhat important 3—fairly important 4—very important

[2]Mean and standard deviation by grade:

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adult	2.543	0.573

ROUND 2, PART II QUESTIONNAIRE: MEANS[1] AND RATINGS[2]

item	pre-sch.	elem.	jr. hi	high	college	adult	overall
106. use quarry materials to make musical instruments	1.52 5	1.76 3	1.72 2	1.35 1	1.34 1	1.15 1	1.47 2
107. write poetry, prose, drama, with quarry-related themes	1.03 3	2.17 4	2.61 4	2.54 3	2.29 3	1.75 2	2.06 3

[1]These numbers correspond with the values 1, 2, 3 and 4 on the questionnaire.
1—not important at all 2—somewhat important 3—fairly important 4—very important

[2]Mean and standard deviation by grade:

age level	mean	standard deviation
preschool	1.102	0.389
elementary	1.812	0.552
junior high	2.395	0.547
high school	2.732	0.526
college	2.851	0.601
adult	2.543	0.573

APPENDIX 7

SURVEY OF QUARRY EMPLOYEES

On the following page is a copy of the questionnaire distributed to Quarry employees. The response rate was:

salaried employees	29.6% (8 out of 27)
hourly employees	16.6% (26 out of 156)
total employees	18.6% (34 out of 183).

In response to item #4 "How have visitors affected your job?" and in general comments, there was only one negative reply. There were two suggestions that restroom facilities other than the limited facilities in the office be used. One person said that having visitors "makes me nervous". There were three comments indicating that the respondent was happy to have visitors see what Quarry operation were really like and felt that visitors left with a more positive attitude. One suggestion was that a person from employee relations conduct tours/field trips.

The number(out of 34) and the percentage response are located to the left of each item on the questionnaire.

Table 8.--Responses to Survey of Employees (imposed on questionnaire)

As an employee of Jamesville Quarry, you have probably noticed the buses and cars of visitors, many of them school children. They have come to see what the Quarry is like, to learn about its important place in our lives, and to become aware of some of the problems we face and ways of solving them. We'd like your help in planning a safer, better visit for them. You can help by checking off answers on this questionaire. Thank you!

1. IF YOU ARE UNFAMILIAR WITH ANY OF THE PLACES BELOW, JUST DRAW A LINE THROUGH IT.

Please place a check mark in front of the places we should take visitors:	Responses[1]	Please place a check mark in front of the places we should not take visitors:	Responses[1]
___blast area	50.0% 17	___blast area	44.1% 15
___office	50.0% 17	___office	44.1% 15
___commerical stone stockpiles	88.2% 30	___commercial stone stockpiles	5.9% 2
___crusher	73.5% 25	___crusher	20.6% 7
___trails	85.3% 29	___trails	11.8% 4
___mined pits	79.4% 27	___mined pits	14.7% 5
___reclaimed areas	88.2% 30	___reclaimed areas	8.8% 3
___tailings pond	55.9% 19	___tailings pond	35.3% 12
___unmined areas	70.6% 24	___unmined areas	20.6% 7
___machinery	76.5% 26	___machinery	20.6% 7
___spoils piles (overlooks)	70.6% 24	___spoils piles (overlooks)	20.6% 7
___other:_____		___other:_____	
_____		_____	

2. Have you ever spoken to any visitors? 38.2% 13 yes ___no

3. Have the visitors affected your job in any way? 11.8% 4 yes ___no

4. If yes, how?_____

_____

_____

[1] right column indicates number of times the response was checked out of 34 returned questionnaires

**********comments welcome on back**********

THANK YOU!!

APPENDIX 8

SURVEY OF CHILDREN

On the following page is the children's questionnaire. The responses and percentages for each are filled in.

There were numerous illustrations of things the students has seen—some very detailed.

One of the most important points brought out by the survey was that the students felt they were on buses too long. When planning field trips in Spring, 1977, this feeling was taken into consideration and the pace of the field trips was carefully scheduled.

Table 9.—Responses to Survey of Children (imposed on questionnaire)

JAMESVILLE QUARRY SCHOOL QUESTIONAIRE

1. Female Male (circle one) 17 girls, 9 boys

2. Age___ 18 12-year-olds, 8 13-year-olds

3. Describe your visit to the Jamesville Quarry. Use words and pictures.

4. What was the weather like? good 16 bad 7 don't remember 2 1-no response

5. What did you like best about the Quarry?
   blast—21 trucks—2 no response—1
   fossils—1 seeing different things—1

6. What didn't you like? liked everything—6
   reclamation—1 no restrooms—1 fossils—2 helmets—1
   rain—3 bus ride—10 overlooks—1 fall down—1

7. If you were in charge of taking visitors around the Quarry, what would be the one thing you would make sure you showed them?
   blast—17
   Why? reclamation—2
   quarry floor—1
   get off and touch—1
   ride Euclids—1
   different rocks—2
   trucks—2
   crusher—1

Thank you!

USE THE BACK IF YOU NEED MORE ROOM OR FOR ANY OTHER COMMENTS.

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Empire State Paper Research Institute
Institute of Environmental Program Affairs
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Adirondack Ecological Center

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WANAKENA CAMPUS
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Forest Technician Program

WARRENSBURG CAMPUS
WARRENSBURG, N. Y. 12885
Charles Lathrop Pack Demonstration Forest
Summer Field Program

APPENDIX 9

SURVEY OF INDUSTRIAL RESOURCES: LETTER, SURVEY, CORPORATION AND RESPONSE

As one of the leading industrial firms in the United States, you are undoubtedly concerned about resources, energy, the technological future and environmental considerations. We are interested in learning of your responses to these issues and your participation in environmental education. For the purposes of our investigation "environmental education" can be defined as any experience (field trip, simulation, publication, audiovisual material, etc.) that deals with man's relationships with his natural or man-made environment. Subjects may include pollution, resource allocation, conservation, technology, planning, population and more traditional topics such as geology, biology, history, etc. The content may not be a specific subject, rather an interdisciplinary approach emphasizing evaluation and problem solving techniques.

I am working on a research project to develop an environmental education curriculum for the Jamesville, New York (Allied Chemical Corporation) Quarry. This is a cooperative effort between Allied Chemical, the College and local educators. One of the unique features is that the program will be centered around a working industrial site: Jamesville Quarry. I am particularly interested in obtaining information about proposed or existing environmental education programs (as broadly described above) utilizing working industrial sites. Mines, manufacturing plants, distribution centers,

offices, stores, or other commercial locations can be considered such working sites. As a part of our project and to aid us in developing the instructional program, we are anxious to learn about other similar programs.

To help us in this effort of documenting the participation of business and industry in environmental education programs, I would appreciate you, or another appropriate person, responding to the questions on the brief questionaire I have enclosed. Also, if you can send me reports, study materials, or other pertinent information on your environmental education activities, it would be appreciated and most helpful.

Thank you for your cooperation!

Kathryn M. Buffington,
Research Assistant
315-473-8762

1. Respondent and position:

2. ___No environmental education program
___We have an environmental education program in the planning stages
___We have an environmental education program in operation

3. Name and address of program/contact person (if different from above):

4. Please describe the site of your environmental education program:

5. Approximately how many visitors do you have/expect to have per year, per category?
____elementary school students
____middle school students
____high school students
____college students
____adults (in organized groups)
____youths (in organized groups)
____families (numbers of individuals)
____other:_____ _____

6. How do/will your visitors find out about the program?

7. The program is/will be operational:
A. ___fall ___winter ___spring ___summer
B. ___weekdays ___weekends ___all week

8. Please describe your facilites for visitors--buildings, displays, trails, etc.:

9. Please briefly describe the instructional materials you have developed--guides, movies, slide shows, annual reports, etc.).

10. Who sets up/will set up appointments with visitors?

11. Who actually guides/will guide visitors on site?
___teacher ___public relations person ___consultant ___other:

12. Have you found any special problems--safety, insurance, cost, interference with plant or business operation?

13. Is this program completely funded by your company? ___yes ___no
If no, other sources:
Approximate annual cost:

14. Comments (please attach an extra sheet if needed):

THANK YOU VERY MUCH! POSTAGE HAS BEEN PAID--SIMPLY FOLD AND SEAL

Table 10.—Industrial Resources Survey: Corporations, Headquarters' Cities and Responses

Corporation and Headquarters[1]	Response
1. Exxon New York, New York	man called, tried to return call repeatedly to no avail
2. General Motors Corp. Detroit, Michigan	no response
3. Texaco, Inc. New York, New York	letter: no program but sent booklet on their pollution control efforts: "Protecting the Environment"
4. Ford Motor Company Dearborn, Michigan	sent questionnaire: "no program"
5. Mobil Oil Corp. New York, New York	letter: do not have time for questionnaires; sent material: newspaper ads, in-house newsletter, "Mobil and Society", "Pollution Prevention at a Modern Refinery", "Major Current Environmental Activities", "Research, the Hidden Dimension", "Toward a National Energy Policy", and "Questions and Answers About Plastic Bags and the Environment"
6. Standard Oil Company of California San Francisco, Calif.	sent questionnaire: "yes, have program"; booklets: "Urban Drilling", on various refineries, "Chevron Story", and tour booklets
7. International Business Machines Armonk, New York	Steve Armaugh called to say he had referred questionnaire to another man in White Plains, never heard from him
8. Gulf Oil Corp. Pittsburgh, Penn.	no response

[1]The ranking of corporations is from the Fortune 500 list—Exxon is listed as the corporation with the largest gross sales for the year ending December 31, 1975

Corporation and Headquarters	Response
9. General Electric Co. Schenectady, New York	sent questionnaire: "no program"
10. Chrysler Corporation Detroit, Michigan	no response
11. International Telephone and Telegraph Corp. New York, New York	no response
12. Standard Oil (Indiana) Chicago, Illinois	no response
13. U.S. Steel Corporation Pittsburgh, Penn.	letter: each division (5 in U.S.) responsible for its own facilities; do have speaker's bureau at headquarters
14. Shell Oil Company Houston, Texas	no response
15. Atlantic Richfield Co. Philadelphia, Penn	questionnaire: "yes have program" also sent book: Environmental Protection Training Program for employees
16. Continental Oil Co. Stamford Conn.	letter referring to Consolidation Coal Co., CCC sent letter and booklets: "Mother Nature Makes a Comeback", "The Mighty Sun"; also have 3 movies available for use, 2 are about reclamation efforts
17. E.I. duPont deNemours and Company, Inc. Wilimington, Delaware	no response
18. Western Electric Company New York, New York	no response
19, Proctor & Gamble Company Cincinnati, Ohio	no response
20. Westinghouse Electric Corp. Pittsburgh, Penn.	questionnaire: "yes, have program" in-house programs for pollution

Corporation and Headquarters	Response
20. Westinghouse, continued	control; awards for "minimizing the impact of technology on the environment
21. Union Carbide Corp. New York, New York	letter with booklet on pollution control "Environmental Update II" (for employees)
22. Tenneco, Inc. Houston, Texas	no response
23. The Goodyear Tire and Rubber Company Akron, Ohio	questionnaire: "no program" sent booklet "Creating a Quality Environment"--about pollution control and recycling of tires
24. International Harvester Co. Chicago, Illinois	questionnaire: "no program"
25. Occidental Petroleum Corp. Los Angeles, California	letter: "company structure is so fragmented...that it would be impossible to reply to your questionaire"
26. Phillips Petroleum Company Bartlesville, Oklahoma	questionnaire: "no program" but, the brochure "The Casebook... Examples in Environmental Protection", seems to indicate a progam involving tours, speakers
27. Union Oil Company of Calif. Los Angeles, California	no response
28. Bethlehem Steel Corp. Bethlehem, Penn.	letter: they give tours, provide books, movies, and speakers on pollution control and minimizing environmental damage
29. Caterpillar Tractor Co. Peoria, Illinois	no response
30. Eastman Kodak Company Rochester, New York	no response

Corporation and Headquarters	Response
31. Rockwell International Pittsburgh, Penn	no response
32. Dow Chemical Midland, Michigan	questionnaire: "yes have program"
33. Kraftco Corporation Glenview, Illinois	no response
34. RCA Corporation New York, New York	no response
35. Esmark, Inc. Chicago, Illinois	no response
36. Sun Oil Company Philadelphia, Penn.	no response
37. LTV Corpation Dallas, Texas	no response
38. Beatrice Foods Company Chicago, Illinois	no response
39. Xerox Corporation Rochester, New York	phone call: Art Zuckerman, no such program
40. United Technologies Corp. Hartford, Conn.	no response
41. Greyhound Corporation Phoenix, Arizona	letter, they have a policy of not participating in questionaire studies
42. The Firestone Tire and Rubber Company Akron, Ohio	no response
43. Boeing Company Seattle, Washington	questionnaire" "no program" but they give plant tours
44. General Foods Corporation White Plains, New York	have a policy of not responding to questionnaires; sent "GF and the Environment", tells about pollution control and recycling

Corporation and Headquarters	Response
45. Ashland Oil Inc. Ashland, Kentucky	no response
46. Monsanto Company St. Louis, Mo.	no response
47. W.R. Grace & Company New York, New York	letter: no program
48. R.J. Reynolds Industries, Inc. Winston-Salem, N.Carolina	letter: tours, speakers, audio-visual presentations
49. Litton Industries, Inc. Beverly Hills, Calif.	questionnaire: "no program"
50. Lockheed Aircraft Corp. Burbank, California	questionnaire: "no program"
51. Borden, Inc. New York, New York	no response
52. McDonnell Douglas Corp. St. Louis, Mo.	sent policy statment and 2 annual reports, no letter
53. Cities Service Company New York, New York	questionnaire: "no program"
54. Amerada Hess New York, New York	no response
55. Ralston Purina Company St. Louis, Mo	no response
56. Minnesota Mining and Manufacturing Company St. Paul, Minnesota	letter with brochures on "Commute-a-Van Program and "The 3 P Program" (Pollution Prevention Pays)
57. Continental Can, Inc. New York, New York	no response
58. International Paper Co. New York, New York	no response

Corporation and Headquarters	Response
59. Armco Steel Corporation Middleton, Ohio	letter: they have an information center at corporate headquarters
60. Sperry Rand Corporation New York, New York	questionnaire: "no program"
61. Getty Oil Company Los Angeles, California	questionnaire: "yes, have program"
62. Deere and Company Moline, Illinois	no response
63. Marathon Oil Company Findlay, Ohio	letter: no formal program but they have site visits and give out teacher information
64. The Coca-Cola Company Atlanta, Georgia	letter: do not fill out surveys; put out kit "Man in his Environment" but has been out of print since 1971
65. American Can Greenwich, Conn.	no response
66. Colgate-Palmolive Company New York, New York	no response
67. Honeywell, Inc. Minneapolis, Minnesota	no response
68. CPC International, Inc. Englewood Cliffs, NJ	no response
69. Gulf and Western Industries, Incorporated New York, New York	no response
70. The Bendix Corporation Southfield, Michigan	letter saying they had referred my questionnaire to the American Forest Institute; questionaire: "yes, have program" from AFI
71. TRW, Incorporated Cleveland, Ohio	letter: "no program"

Corporation and Headquarters	Response
72. American Brands New York, New York	no response
73. The Singer Company New York, New York	letter: do not accept questionaires
74. Philip Morris, Inc. New York, New York	letter: no program, tours as requested
75. Consolidated Foods Corp. Chicago, Illinois	no response
76. Standard Oil (Ohio) Cleveland, Ohio	questionnaire: "no program"
77. Textron, Inc. Providence, Rhode Island	no response
78. Weyerhaeuser Company Tacoma, Washington	no response
79. Champion International Corp. Stamford, Conn.	no response
80. Georgia-Pacific Corp. Portland, Oregon	letter: sent many brochures; museum on logging history, recreation sites, timberlands for public use, tours of sawmills
81. Republic Steel Corp. Cleveland, Ohio	letter: yes, have programs: tours, brochures, films
82. Allied Chemical Corp. Morristown, New Jersey	letter: in-house energy conservation program
83. PepsiCo, Inc. Purchase, New York	no response
84. General Mills, Inc. Minneapolis, Minnesota	questionnaire: "no program", but do send out speakers on request
85. Alcoa Pittsburgh, Penn.	letter: brochures on pollution control and recycling; field trips to mining and reclamation sites

Corporation and Headquarters	Response
86. FMC Corporation Chicago, Illinois	no response
87. American Motors Corp. Detroit, Michigan	no response
88. Owens-Illinois, Inc. Toledo, Ohio	no response
89. American Home Products New York, New York	no response
90. Raytheon Company Lexington, Mass	no response
91. National Steel Corporation Pittsburgh, Penn.	no response
92. Johnson & Johnson New Brunswick, New Jersey	questionnaire: "no program"
93. Uniroyal, Inc. New York, New York	no response
94. United Brands Company New York, New York	returned twice by post office, couldn't find a third address
95. Warner-Lambert Company Morris Plains, New Jersey	no response
96. NCR Corporation Dayton, Ohio	no response
97. Signal Companies Beverly Hills, California	no response
98. General Dynamics Corp. St. Louis, Mo.	no response
99. Inland Steel Company Chicago, Illinois	no response
100. Carnation Company Los Angeles, California	no response

Corporation and Headquarters		Response
101.	Dresser Industries, Inc. Dallas, Texas	no response
102.	Pullman, Inc. Chicago, Illinois	no response
103.	Nabisco, Inc. New York, New York	questionnaire: "no program"
104.	Burlington Industries, Inc. Greensboro, N. Carolina	letter: no program, but they do respond to inquiries
105.	CBS, Incorporated New York, New York	no response
106.	American Cyanamid Wayne, New Jersey	no response
107.	B. F. Goodrich Company Akron, Ohio	questionnaire: "no program"
108.	Celanese Corporation New York, New York	no response
109.	PPG Industries Pittsburgh, Penn.	no response
110.	Bristol-Myers Company New York, New York	no response
111.	Archer Daniels Midland Co. Decatur, Illinois	no response
112.	Norton Simon, Inc. New York, New York	no response
113.	Iowa Beef Processors, Inc. Dakota City, Nebraska	no response
114.	Standard Brands, Inc. New York, New York	no response
115.	Kerr-McGee Chemical Corp. Oklahoma City, Oklahoma	no response

Corporation and Headquarters		Response
116.	Central Soya Company, Inc. Fort Wayne, Indiana	questionnaire: "no program"
117.	Crown Zellerbach Corp. San Francisco, California	no response
118.	The General Tire and Rubber Company Akron, Ohio	no response
119.	Teledyne, Inc. Los Angeles, California	no response
120.	Combustion Engineering, Inc. Stamford, Conn.	no response
121.	Ingersoll-Rand Woodcliff Lake, New Jersey	no response
122.	Amstar New York, New York	no response
123.	Reynolds Metals Company Richmond, Virginia	questionnaire: "yes, have program"
124.	Burroughs Corporation Detroit, Michigan	questionnaire: "no program"
125.	Pfizer, Incorporated New York, New York	no response
126.	H. J. Heinz Company Pittsburgh, Penn.	no response
127.	Anheuser-Busch St. Louis, Mo.	no response
128.	Borg-Warner Corp. Chicago, Illinois	no response
129.	American Standard New York, New York	questionnaire: "no program"

Corporation and Headquarters		Response
130.	Kaiser Aluminum and Chemical Corporation Oakland, California	no response
131.	Babcock & Wilcox Company New York, New York	no response
132.	Eaton Corporation Cleveland, Ohio	no response
133.	Campbell Soup Company Camden, New Jersey	no response
134.	Lykes-Youngstown Corp. New Orleans, Louisiana	no response
135.	Farmland Industries, Inc. Kansas City, Mo.	no response
136.	I C Industries Chicago, Illinois	no response
137.	Pittston Company New York, New York	no response
138.	Ogden Corporation New York, New York	no response
139.	Merck & Company, Inc. Rahway, New Jersey	questionnaire: "no program", but subsidiaries supply information to teachers
140.	Kimberly-Clark Corp. Neenah, Wisconsin	no response
141.	Associated Milk Producers San Antonio, Texas	no response
142.	Whirlpool Corporation Benton Harbor, Michigan	questionnaire: "yes, have program"; letter explains it: in-house
143.	Boise Cascade Corp. Boise, Idaho	no response

Corporation and Headquarters		Response
144.	Allis Chalmers Corp. Milwaukee, Wisconsin	no response
145.	Clark Equipment Company Buchanan, Michigan	no response
146.	Hercules, Inc. Wilmington, Delaware	no response
147.	North American Phillips Corporation New York, New York	no response
148.	Gillette Company Boston, Massachusetts	no response
149.	Studebaker-Worthington Corp. New York, New York	no response
150.	St. Regis Paper Company New York, New York	letter: have exhibits at various locations

Industrial Association and Headquarters		Response
1.	American Forest Institute Washington, D.C.	provide materials for visitors' programs to members
2.	American Iron and Steel Institute Washington, D.C.	booklets and films to members and public
3.	National Association of Manufacturers Washington, D.C.	no response
4.	National Crushed Stone Association Washington, D.C.	booklets and films to members and public

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Heiberg Memorial Forest
Genetic Field Station

WANAKENA CAMPUS
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Charles Lathrop Pack Demonstration Forest
Summer Field Program

APPENDIX 10

SURVEY OF EDUCATIONAL/ENVIRONMENTAL RESOURCES: LETTER, PERSON/ORGANIZATION, RESPONSE

I am working on a research project under Dr. David Hanselman in Educational Communications here at the College. The project involves a cooperative effort between the Jamesville, New York, Quarry (Allied Chemical Corporation), the S.U.N.Y. College of Environmental Science and Forestry, and selected local educators. We are working to develop an environmental education curriculum for the Quarry. A final report will be made available upon completion of the project.

One of the unique features of the project is that it is centered around a working quarry operation. I am seeking information about environmental education programs at sites other that "nature", "outdoor", or "environmental" centers. I am particularly interested in activities with groups before and after they visit the site, special problems encountered on a site not normally used for environmental education, involvement with private business or industry, and reactions to the total experience. Any information you can send will be greatly appreciated. If it is more convenient, let me know a good time to call you and I will do so.

Thank you,

Kathryn M. Buffington
Research Assistant

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Table 11.—Educational/Environmental Resources Survey: Person/ Organization and Response

Person/organization and address[1]	Response
1. Miss Donna Bentley Environmental Education Specialist State Department of Education Room 607, State Office Bldg. Montgomery, Alabama 36104	no information on such programs
2. Specialist, Environmental Education State Department of Education Pouch F Juneau, Alaska 99801	no response
3. Mr. Fred J. Sughrue Deputy Assoc. Superintendent Arizona State Dept. of Education 1535 West Jefferson Phoenix, AZ 85013	3 referrals (#59,60,61)
4. Dr. Bessie Moore Director of Env. Education State Dept. of Education New Education Building Little Rock, Arkansas 72201	no response
5. Mr. Rudoph J. H. Schafer Consultant in Env. Education State Department of Education State Education Building 721 Capitol Mall Sacramento, CA 95814	no response
6. Mr. George Ek Consultant, Env. Ed. Learning Unit State Department of Education State Office Building 201 East Colfax Denver, Colorado 80203	no response

[1] Some names and addresses have beer updated and are different from the originals found in the Conservation Directory and Environmental Information Report.

Person/organization and address	Response
7. Dr. Sigmund Abeles Consultant in Science Education P.O. Box 2219 State Department of Education Hartford, CT 06115	no response
8. Mr. John F. Reiher Supervisor, Science and Env. Ed. State Dept. of Public Instruction Townsend Building Dover, Delaware 19901	1 referral (#68)
9. Mrs. Ethel Hackney Asst. Director, Dept. of Science District of Columbia Public Schools Madison School Building 10th and G Streets, N.E. Washington, D.C. 20002	no response
10. Mr. C. Richard Tillis Chief, Bureau of Env. Ed. Knott Building Tallahassee, Florida 32304	no information on such programs
11. Mr. Dallas W. Stewart Science Coordinator State Department of Education Division of Curriculum Devel. Education Annex Building Atlanta, Georgia 30334	no response
12. Robert M. Ogata Program Specialist, Env. Ed. Department of Education P.O. Box 2360 Honolulu, Hawaii 96804	no information on such programs
13. Mr. Richard Kay Len B. Jordan Office Building Boise, Idaho 83720	no response

Person/organization and address	Response
14. Dr. Lance Bedwell Env. Ed. Specialist Office of the State Superintendent of Public Instruction 316 South Second Street Springfield, Illinois 62706	no response
15. Mr. Joe E. Wright Env. Ed. Consultant Division of Curriculum State Dept. of Public Instruction 10th Floor, 120 W. Market Street Indianapolis, Indiana 46204	no response
16. Ronald Harshman Env. Ed. Coordinator Department of Public Instruction Grimes State Office Bldg. Des Moines, Iowa 50319	1 referral (#69)
17. Mr. J. Clayton Stultz Program Specialist, Economic Ed. State Department of Education 120 East 10th Street Topeka, KS 66612	no response
18. Terry L. Wilson Consultant for Env. Ed. State Dept. of Education Capitol Plaza Towers Frankfort, KY 40601	1 referral (#103)
19. Dr. Edward Dayton, Jr. Supervisor of Env. Ed. and Science State Department of Education Box 44064 Baton Rouge, Louisiana 70804	no response
20. Dean Bennett, Consultant Department of Educational and Cultural Services Augusta, ME 04333	1 contact (#62) and "Guidelines for Developing Total School/Community Environmental Learning Experiences"
21. Dr. James W. Latham, Jr. Consultant in Science State Department of Education P.O. Box 8717, Friendship International Airport Baltimore, MD 21240	3 referrals (#52,53,54)

Person/organization and address	Response
22. Mr. Raymond L. Gehling, Jr. Senior Supervisor in Env. Ed. State Department of Education 182 Tremont Street Boston, Mass 02111	no information on such programs
23. Mr. Jack Kammeraad Science-Env. Ed. Specialist State Department of Education Box 420 Lansing, Michigan 48902	no information on such programs
24. Mr. John C. Miller Env. Ed. Program Coordinator State Department of Education 644 Capitol Square Bldg. St. Paul, Minnesota 55101	no response
25. Mr. Michael G. Carothers Supervisor of Env. Ed. State Department of Education Division of Instruction Box 771 Jackson, Mississippi 39205	recommended US Forest Service "Investigating Your Environment"
26. Mr. Jack Roy Director of Curriculum Implementation State Department of Education Box 480 Jefferson City, MO 65101	no information on such programs
27. Ed Eschler Coordinator, Env. Education State Capitol Building Helena, Montana 59601	no information on such programs
28. Dr. Roger E. Macklem Science Consultant State Department of Education 233 South 10th Street Lincoln, Nebraska 68508	1 referral (#66)

Person/organization and address	Response
29. Mr. Jack S. O'Leary Science Consultant State Department of Education Heroes' Memorial Building	no response
30. Mr. William Ewert Consultant in Science Education State Department of Education 64 North Main Street Concord, NH 03301	no response
31. Mr. Louis Iozzi Env. Education Consultant Division of Curr. and Instruction State Department of Education 225 West State Street Trenton, NJ 08625	no response
32. Mr. B.K. Graham Science and Math Specialist State Education Building Santa Fe, New Mexico 87501	1 contact (#63)
33. Mr. Barry W. Jamason Supervisor, Environmental Ed. State Department of Education Albany, NY 12224	1 contact (#55)
34. Mr. Paul Taylor Director of Env. Education State Department of Pub. Instr. Room 284 Raleigh, NC 27611	no response
35. Mr. George Fors Science and Math Consultant Department of Public Instruction Bismarck, ND 58501	no response
36. Dr. John Hug Supervisor of Env. Education State Dept. of Education 65 South Front Street Columbus, Ohio 43215	no information on such programs

Person/organization and address	Response
37. Mr. Howard T. Potts Coordinator Research, Planning and Evaluation Section State Department of Education State Capitol Oklahoma City, OK 73105	no information on such programs
38. Ms. Mary Lewis State Board of Education 942 Lancaster Drive, NE Salem, Oregon 97310	no response
39. Mrs. Eleanor H. Bennett Environmental Education Advisor State Dept. of Public Instruction Box 911 Harrisburg, PA 17126	3 referrals (#56,57,58)
40. Mr. H. Wells French Consultant, Program Development State Department of Education Hayes Street Providence, RI 02908	no response
41. Mrs. Alice Linder State Science Consultant State Department of Education Room 110, Rutledge Office Bldg. Columbia, SC 29201.	no response
42. Mr. Wallace E. Bertrand Env. Education Consultant Box 135 University of South Dakota Vermillion, SD 51069	no response
43. Mr. Jerry Rice, Science Spec. State Department of Education Division of Instruction Nashville, Tennessee 37219	2 referrals (#64, 65)
44. Mr. Bill Story Educational Program Director, Science Section Texas Education Agency 201 East 11th Street Austin, Texas 78701	no information on such programs

Person/organization and address	Response
45. Mr. Richard S. Peterson State Board of Education 1400 University Club Building 136 East South Temple Salt Lake City, Utah 84111	no response
46. Mr. John Stevens Co-ordinator of Env. Studies and Science State Department of Education Montpelier, VT 05602	no response
47. Mr. George W. Burton Assistant Superintendent for Administration Field Services State Department of Education Box 6-Q Richomond, Virginia 23216	no response
48. Mr. David Kennedy Supervisor of Env. Ed. Programs State Department of Education Office of State Superintendent Old Capitol Building Olympia, WA 98504	no response
49. Mr. Robert Seymour Env. Education Consultant State Department of Education Capitol Complex Room B-318, Building 6 Charleston, WV 25305	no response
50. Mr. David C. Engleson Specialist, Env. Education Department of Public Instruction 126 Langdon Street Madison, Wisc. 53702	no response
51. Mr. George Bohl Coordinator, Math/Science State Department of Education Capitol Building Cheyenne, WY 82002	no response
52. Ray Trimmer Director of Education Maryland Academy of Science 601 Light Street Baltimore, MD 21230	no response

Person/organization and address	Response
53. Joseph Howard Director of Environmental Education Montgomery Co. Public Schools 858 Hungerford Drive Rockville, MD 20850	no response
54. John P. Williams, Director Chesapeake Bay Foundation Box 1709 Annapolis, MD 21404	no information about such programs
55. International Paper Company ATTN: Bill Turner Region 6 Woodlands and Wood Products Ops. Jay, Maine 04239	use American Forestry Institute materials
56. Harry T. Barnes Pennsylvania Power and Light Turbotville, PA 17772	no response
57. Robert Rumpt Gladfelter Pulp and Paper Co. 25 S. Hanover Street Carlise, PA 17013	no response
58. Conrad Guenther Department of Army, Corp of Engineers Federal Building 1000 Liberty Avenue Pittsburgh, PA 15222	no response
59. Dr. Henry Dahlberg, Director Community Nature Center Prescott Public Schools P.O.Box 1231 Prescott, AZ 86301	no information about such programs
60. Mr. A.G. Mabry, Director Project LIFE 2701 North Izabel Flagstaff, AZ 86001	no information about such programs
61. Mr. Carlos Nagel, Coordinator Mexico Unit Arizona-Sonora Desert Museum Box 5607 Tucson, AZ 85703	no information about such programs

Person/organization and address	Response
62. Sheila Bennett, Env. Educator Brookside School Waterville, Maine 04901	sent information
63. Dr. David Shortess Biology Professor New Mexico Institute of Mining and Technology Socorro, New Mexico 87801	no information on such programs
64. Dr. Ruth Neff Tennesee Environmental Council 323 McLemore Street Nashville, Tennesse 37219	2 referrals (#65,96)
65. John Grant Tennesse Department of Conservation 2611 West End Avenue Nashville, TN 37219	no response
66. Ted Lannan Nebraska Outdoor Encounter Box 805 Chadron, NE 59337	1 referral (#67)
67. Hank Schauffermayer, Director Project Stream WebsterCollege St. Louis, Missouri	no response
68. Jim Allen Environmental Education Sup. Appoquinimink School District Odessa, Delaware	sent information on Projects GRIPIN and SEE
69. Ronald Harshman Coordinator, Project SCATE Curriculum Division Department of Public Instr. Grimes State Office Bldg. Des Moines, Iowa 50319	letter citing problems in organizing program
70. Alliance for Environmental Ed.,Inc. c/o James Aldrich, Executive Director Suite 113, 1785 Massachusetts Ave., NW Washington, DC 20036	no response

Person/organization and address	Response
71. American Alliance for Health, Physical Education and Recreation 1201 16th Street, NW Washington, DC 20036	no response
72. American Association for the Advancement of Science 1515 Massachusetts Ave., NW Washington, DC 20005	7 referrals (105-111)
73. American Association for Conservation Information c/o Chuck Post Secretary-Treasurer Game, Fish and Parks Department State Office Building Pierre, DS 57501	no response
74. American Conservation Association, Inc. 30 Rockefeller Plaza Room 5425 New York, New York 10020	no response
75. American Nature Study Society c/o Ruth Melvin 8535 Winchester Road Carroll, Ohio 43112	no response
76. American Petroleum Institute 1801 K Street, NW Washington, DC 20006	no information on such programs
77. Association of Interpretive Naturalists 6700 Needwood Road Derwood, MD 20855	no response
78. The Conservation Foundation 1717 Massachusetts Avenue, NW Washington, DC 20036	no response
79. National Association for Env. Ed. 5940 Southwest 73rd Street Miami, Florida 33143	no response
80. National Audubon Society 950 Third Avenue New York, New York 10022 attn: Richard J. Manly, Nature Centers Planning	no response

Person/organization and address	Response
81. Natural Resources Council of America Suite 911 1025 Connecticut Ave., NW Washington, DC 20036	no information on such programs
82. Conservation Education Assoc. c/o Jane Westenberger Director, Office of Information USDA, Forest Service 630 Sansome Street San Francisco, CA 94111	no response
83. Robert C. Mings Center for Environmental Studies Department of Geography Arizona State University Tempe, AZ 85281	1 referral (#98)
84. Peter Messina Sierra Club Information Services Mills Tower San Francisco, CA 94105	no information on such programs
85. Joan Martin, Asst. Director Thorne Ecological Institute 2336 Pearl Boulder, Colorado 80302	sent information
86. Ms. Joan Nicholson, President The Bolton Institute Suite 302 1835 K Street, NW Washington, DC 20006	1 referral (#97)
87. John Cary Stone Coordinator, Educational Serv. The National Wildlife Federation 1412 16th Street, NW Washington, DC 20036	1 referral (#99)
88. Dr. A. D. Hinckley Environmental Assembly TIE (The Institute of Ecology) 1717 Massachusetts Avenue, NW Washington, DC 20036	1 referral (#100)
89. Phil DeLongchamps US Department of the Interior Bureau of Land Management Washington, DC 20240	sent information

Person/organization and address	Response
90. Jeff Carroll Env. Education Specialist USDA Forest Service Washington, DC 20250	no information on such programs
91. Walter Jeske Chief, Education and Publications Branch, Soil Conservation Serv. US Department of Agriculture Washington, DC 20250	no response
92. William M. Partington Environmental Information Center of the Florida Cons. Foundation 935 Orange Avenue Winter Park, Florida 32789	no response
93. Jack Snell Alliance for Environmental Ed. 635 South Main Street South Bend, Indiana 46623	no response
94. Hermann H. Fields Tufts University Eaton Hall, 307 Medford, Mass 02155	no response
95. Dr. Albert B. Dickas Center for Lake Superior Environmental Studies University of Wisconsin Superior, Wis. 54880	no information on such programs
96. Paul Wishart School of Education University of Tennessee Knoxville, TN 37916	no response
97. David Dodson Gray 4 Linden Square Wellesley, MA 02181	1 referral (#101)
98. Dr. Melvin Marcus Director, Arizona State University Center for Environmental Studies Tempe, AZ 85281	no response

Person/organization and address	Response
99. Embassey Dairy Southland Corporation 2828 North Haskell Street Dallas, Texas	no response
100. Environmental Educators change of owner, name, etc. see #104	—
101. Sandra Stevens Education Development Center 55 Chapel Street Newton, Mass 02160	sent information
102. Public Service Company of Colorado 550 15th Street Denver, Colorado (program at Fort St. Urain Nuclear Plant)	no response
103. Mr. Lynn Hodges Env. Education Specialist Division of Forestry, Fisheries and Wildlife Tennessee Valley Authority Norris, TN 37828	sent information
104. Anne Adamcewiz, Managing Editor EE Reports Center for Environmental Education 2100 M Street, NW Washington, DC 20037	no information on such programs
105. Harold D. Mahan, Director Cleveland Museum of Natural History Wade Oval, University Circle Cleveland, Ohio 44106	no response
106. Laura Williamson, Manager OSPRIG 408 SW 2nd Street Portland, OR 97204	moved, no forwarding address

Person/organization and address	Response
107. Kay Davis, Projects Coordinator Fernbank Science Center 156 Heaton Park Drive, NE Atlanta, Georgia 30307	no response
108. Ed Hessler Minnesota Environmental Sciences Foundation, Inc. 5400 Glenwood Avenue Minneapolis, Minn 55422	sent information in letter
109. Edward J. Ambry, Director New Jersey State Council for Environmental Education Montclair State College Upper Montclair, NJ 07043	no response
110. George E. Grube, Director Quality Environment Council of Nebraska and Western Iowa Dana College Blair, Nebraska 68008	no response
111. Grant R. Cary, Project Coord. A Model Education Program in Ecology Laurel Ecology Center 1044 N. Hayworth Avenue Los Angeles, CA 90046	moved, no forwarding address

APPENDIX 11

SCHOOL/GROUP VISITS: SPRING, 1977

Table 12.—School/Group Visits, Spring, 1977

Date	Number	Contact Person	Age level School/Organization
*4-7-77	9	Arthur Lynnworth	Boy Scout Explorers Allied Chemical Corp.
4-13-77	10	Kathy Buffington	College Resources Mgt.class SUNY College of Env. Sci.& For.
4-29-77	11	Dr. Robert Maurer	College Geology class SUNY Oswego
5-24-77	4	teacher/leader orientation day	adults various
5-25-77	11	teacher/leader orientation day	adults various
*5-25-77	56	Jan Ferrell	multi-age (3rd-5th grade) Fayetteville Elementary
6-1-77	44	Judy Domoert	4th graders Woodland Elementary
*6-1-77	60	Gloria Mabie	7th graders Eagle Hill Middle School
6-2-77	45	Marilyn Fleming	4th graders LaFayette School
*6-2-77	60	Gloria Mabie	7th graders Eagle Hill Middle School
6-6-77	26	Mildred Erickson	2nd and 3rd graders Mott Road Elementary
6-8-77	79	Mary Duffin	3rd and 4th graders Moses Dewitt Elementary
6-9-77	48	Doris Pettman	3rd graders Lyncourt Central School

*scheduled and led by John Ferrell, all others by Kathy Buffington

Date	Number	Contact Person	Age level School/Organization
6-10-77	44	Marilyn Fleming	4th graders L LaFayette School
6-11-77	17	Vern Smith	adult walking group May Memorial Unitarian Society
6-13-77	28	Millie Grimes	6th graders Green Street School
6-14-77	29	Millie Grimes	6th graders Green Street School

*scheduled and led by John Ferrell, all others by Kathy Buffington